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EPA/ROD/R03-94/183
October 1994

EPA Superfund Record of Decision:

North Penn Area 1 Site, Souderton, PA, 9/30/1994

Declaration for the Record of Decision

Site Name and Location

North Penn Area 1 Site
Source Control Remedial Action--Operable Unit 1 (OU1)
Ground Water Interim Remedial Action--Operable Unit 2 (OU2)
Souderton, Montgomery County, Pennsylvania

Statement of Basis and Purpose

This decision document presents the selected remedial action for contaminated soil and the selected interim action for ground water contamination at the North Penn Area 1 Site in Souderton, Montgomery County, Pennsylvania. These remedial actions were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedies for Operable Units 1 and 2. This decision is based on the administrative record for this Site.

The Pennsylvania Department of Environmental Resources has not indicated whether or not it concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

Alternative 3 for soil contamination (Excavation and Offsite Disposal) and a combination of Alternatives 4 and 5 for ground water contamination (Pumping and Treating of the upper interval of the Granite Knitting Mills well and the entire Well S-9), are the selected remedies for the Site.

Alternative 3 for source control will involve the excavation of contaminated soils at each of three properties. The soil would be shipped to an EPA-approved facility for disposal. The remediation goals were developed for each property by evaluating the concentration of contaminants, the depth to ground water, the subsurface conditions, and other factors. The performance standards for remediating the soils, and the estimated quantity of soils needing to be removed for each property, are:

Property	PCE Soil Remediation Goal	Estimated Quantity
Gentle Cleaners	270 ppb	115 cubic yds.
Granite Knitting Mills	260 ppb	400 cubic yds.
Parkside Apartments	820 ppb	95 cubic yds.

Implementation of Alternative 3 for the soil contamination operable unit will remove any threat of direct contact exposure, and will also improve ground water quality by eliminating a continuing source of contamination. Once the contaminated soil is removed, the levels of PCE entering the drinking water aquifer should be significantly reduced.

The selected interim action alternative for the ground water operable unit is a combination of Alternatives 4 and 5. Alternative 4 consists of pumping just the upper interval (the top 30 to 40 feet) of the Granite Knitting Mills well. Alternative 5 involves pumping of the entire Well S-9. The combination of pumping both of these wells addresses the high levels of PCE entering the aquifer from the shallow zone in the area around the GKM well, and the PCE contamination that has already reached the aquifer in the vicinity of Well S-9. Due to the central location of well S-9, pumping it is expected to contain the plume and draw contaminated water from throughout the plume area.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (or a waiver can be justified for any federal and state applicable or relevant and appropriate requirements that will not be met) and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

Because this remedy will result in hazardous substances remaining on Site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. Such reviews will be conducted every five years thereafter until EPA determines that the cleanup levels set forth in this ROD have been achieved, or that the hazardous substances remaining on the Site do not prevent unlimited use and unrestricted exposure at the Site.

Peter H. Kostmayer
Regional Administrator

9/30/94
Date

North Penn Area 1 Site
Souderton, PA
Operable Units 1 and 2

1. Site Name, Location, and Description

Source Control Operable Unit - Remedial Action
Ground Water Operable Unit - Interim Action
Souderton, Montgomery County, Pennsylvania

This Record of Decision (ROD) describes the selection of the remedial action plan to address the sources of contamination at the North Penn Area 1 Site. This ROD primarily addresses the source of contamination at the Site (contaminated soil), but also includes an interim action to address ground water contamination. The source control remedial action has been designated as Operable Unit 1 (OU1), and the ground water contamination remedial action has been designated as operable unit 2 (OU2) for purposes of organizing and identifying remedial actions at this Site.

This Site is located in Souderton, Montgomery County, Pennsylvania, and is one of 12 Sites identified in the North Penn area on the basis of contamination of ground water by volatile organic compounds (VOCs) in production wells. The contamination at the Area 1 Site was first noted in 1979 in North Penn Water Authority (NPWA) well S-9. The well was immediately taken out of service because of the high tetrachloroethylene levels in the ground water. (Tetrachloroethylene is also known as perchloroethene, which is abbreviated as PCE. The term PCE is used in this document, except in the charts where tetrachloroethylene is used). On the basis of this contamination, the Site was proposed for the National Priorities List (NPL) in January 1987, and was placed on the NPL in March 1989.

The Site is located in an area that contains a mixture of commercial and residential uses. All residences within the immediate area use public drinking water supplies. The nearest known downgradient well currently in use for drinking water supplies is approximately 1/2 mile away. There is a park located just south of the plume area. The boundaries of the Site are shown in Figure 1.

After the contamination was identified, potentially responsible party (PRP) searches by EPA identified five facilities in the area that may have contributed to the ground water contamination. These facilities and the ground water contamination were evaluated in the Remedial Investigation/Feasibility Study (RI/FS) that forms the basis for this ROD. The results of the sampling work done during the RI/FS revealed that contamination exists at three of the five properties.

The Site currently consists of the three facilities identified as potential source areas and the bedrock aquifer containing VOC contamination underlying and in the vicinity of those facilities. The three facilities that may have contributed contamination to the ground water are: Gentle Cleaners, Granite Knitting Mills, and Parkside Apartments. Locations of the facilities are shown in Figure 1. Figure 1 also shows the dimensions of the Site based on the locations of the facilities and the approximate distribution of contaminated ground water in the bedrock aquifer.

2. Site History and Enforcement Activities

After the identification of contamination in the ground water in the area in 1979, the NPWA initiated an investigation into the source or sources of the contamination. EPA and the Pennsylvania Department of Environmental Resources (PADER) were notified of the contamination, and over the next several years were involved in investigating the sources.

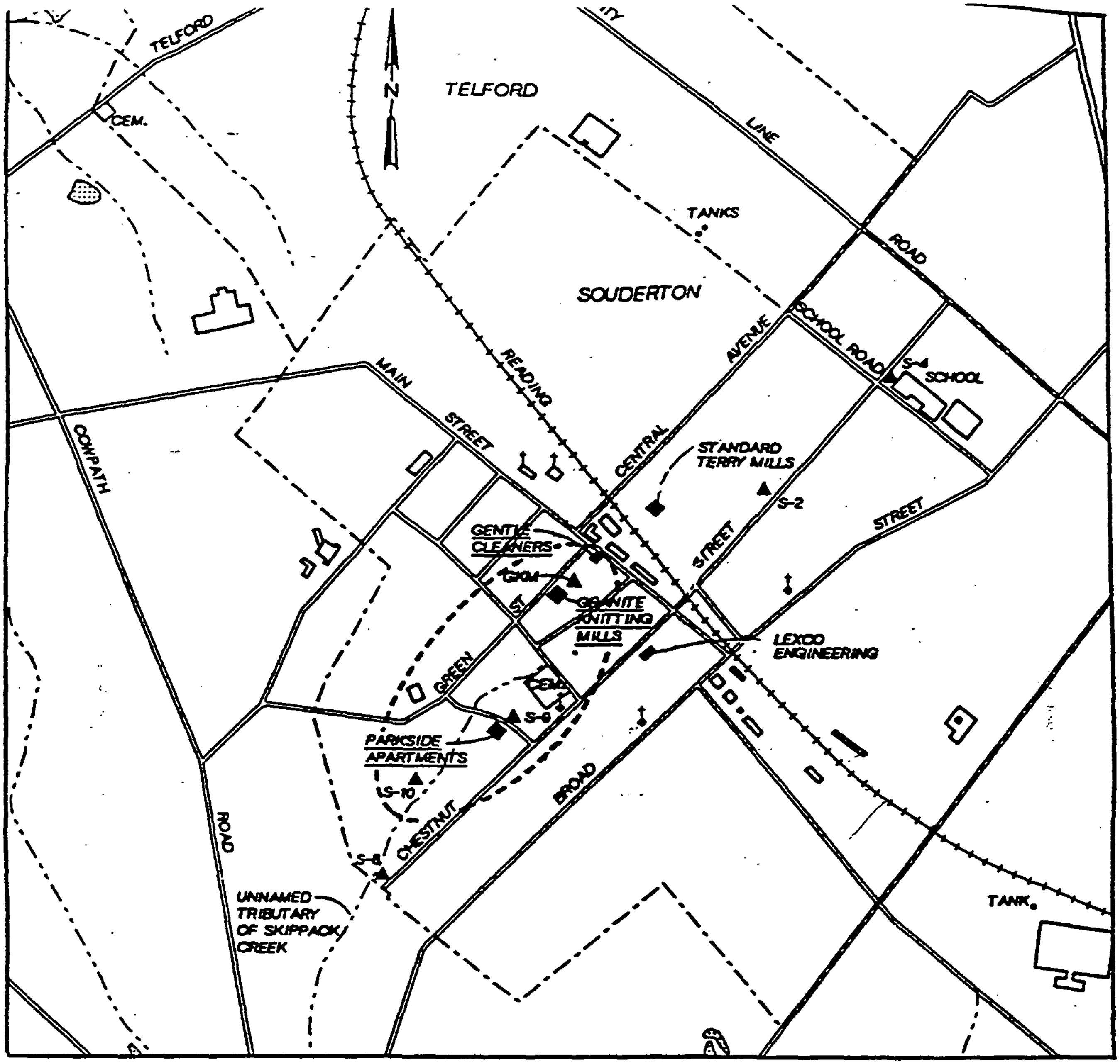
Sampling was conducted at several wells in the area, to determine the types and levels of contamination in the ground water. The following contaminants were identified:

- 1,1,1-Trichloroethane (1,1,1-TCA)
- 1,1-Dichloroethane (1.1-DCA)
- 1,1-Dichloroethene (1.1-DCE)
- cis- and trans-1,2-Dichloroethene (1,2-DCE)
- Tetrachloroethylene (PCE)
- Trichloroethene (TCE)

These contaminants were found in several wells at various times at levels up to 250 parts per billion (ppb).

The following paragraphs discuss the history of each of the properties identified as potential sources of the contamination. Gentle Cleaners began operating before 1953. It is known that between 1953 and 1983, the company used 70 to 100 gallons of PCE per month as well as almost 1 gallon per month of chemicals containing 1,1,1-trichloroethane (1,1,1-TCA) and other chlorinated solvents of unknown composition. Since 1983, the volume of PCE used has been reduced to about 50 gallons per month. The PCE was stored onsite in either an aboveground storage tank or drums. An underground storage tank (UST) also may have been used to store PCE at the facility.

On July 23, 1980, EPA documented a spill of 75 gallons of PCE occurring in the early 1970s. PCE reportedly flowed out the rear door onto the grassed area behind the building. In addition, discharge of PCE to a sink that drained into the same grassed area may have contributed to soil contamination.



SOURCE: U. S. GEOLOGICAL SURVEY 7-1/2 MINUTE QUADRANGLE MAP FOR TELFORD, PA.

LEGEND

▲ S-2	NPWA WELL (Water supply wells)
▲ GKM	GRANITE KNITTING MILLS WELL
–·–·–	BOROUGH AND TOWNSHIP BOUNDARIES
------	PRELIMINARY BOUNDARY OF AREA 1 (NUS, 1986a)
■	FACILITY UNDER STUDY

0 600 1200 1800

SCALE: 1"=1200'

SITE MAP

North Penn Area 1

FIGURE 1

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Granite Knitting Mills (GKM) has operated a knitting mill since the early 1960s. From 1967 to 1979, a dry cleaning machine using PCE was maintained at the facility. Use of the machine may have stopped by 1979. PCE for the machine was stored in a tank inside the building. Wastes generated from the machine were estimated to contain about 2 percent PCE and were stored in drums inside on the southwest side of the building.

Property owners in the area report past discharges from the facility into the alley that runs along the southeast side of the building. These discharges were variously described as solvents and dyes, but their point of origin along the building was not identified. Reportedly, drums containing waste oil with some solvent contamination were stored outside along the southwest side of the building prior to disposal.

The Parkside Apartments property once included a dry cleaning establishment. Before that, the property was used as a beer distributor, and before that, as a slaughterhouse. Three USTs containing petroleum hydrocarbon fuels were once located on the property, but were allegedly removed around 1980. Another UST that may have been present at the south corner of the facility could not be located during EPA's onsite activities. Area residents reported that part of the facility may have been landfilled with dirt and construction debris.

Lexco Engineering and Manufacturing Corporation (Lexco) has used 1,1,1-TCA at its facility since 1979. The facility purchases 110 gallons annually and generates 10 gallons as waste annually. The 1,1,1-TCA is used in a trough and may have spilled or leaked onto the floor. Operations at the facility have been ongoing since before 1960 (Logan Deposition, 1991). The facility uses one UST for oil storage. A second UST in which gasoline was stored is located along the side of the building but is no longer in service.

The former Standard Terry Mills building previously was occupied by a trolley repair shop, supermarket, gas station, knitting mill, and other activities. These operations could have used solvents and chemicals and may have contributed to local groundwater contamination.

The former Standard Terry Mills facility was in operation until May 1991, when a fire occurred at the facility; the buildings were later razed. The facility has undergone a Phase I property assessment, during which the site was primarily evaluated for polychlorinated biphenyl contamination; a report indicated that the facility was uncontaminated. Two USTs were identified at the facility. The current owner of the property reported that one UST was removed about 7 years ago and that two fuel oil tanks were removed around January 1991.

On February 28, 1990, EPA issued general notice letters to the owners and/or operators of the five properties pursuant to Section 107(a) of CERCLA, to inform them of their potential Superfund liability as operators or owners of the properties. On May 20, 1991, EPA again notified the owners and/or operators of these properties of their potential liability for this Site. After several discussions with them concerning the nature and extent of EPA's work to be performed, the owners or operators of the properties indicated that they were not willing and/or able to perform or finance Operable Unit 1 to prevent a release or threatened release of hazardous substances, pollutants, or contaminants from the facility. Therefore, EPA decided to perform the response at Operable Unit 1 with funds from the Hazardous Substance Superfund as authorized by Section 104 of CERCLA, 42 U.S.C. § 7604.

In August, 1991, EPA initiated the RI/FS for this Site. EPA performed investigations that included soil boring, soil sampling and analysis, aquifer testing, and ground water sampling and analysis. The soil sampling defined soil characteristics and levels of soil contamination by VOCs at the facilities. The aquifer testing characterized aquifer hydraulics and provided information needed to evaluate remedial options. The ground water sampling defined the nature and extent of the VOC contamination in the bedrock aquifer at the Site to the extent possible using existing wells; no monitoring wells were installed during the investigations. The results of the RI/FS are further described in Section 5.

3. Highlights of Community Participation

The EPA issued the Proposed Plan for this Site for public comment on July 6, 1994. The RI/FS report, summarized in the Proposed Plan, was also made available to the public. EPA published a notice of availability of these two documents in the North Penn Reporter on July 5, 1994. These and other Site-related documents were made available to the public in both the administrative record file and an information repository maintained at the EPA Docket Room in Region III and at the Indian Valley Public Library in Telford, PA.

In accordance with Sections 113(k)(2)(B)(i-v) and 117 of CERCLA, 42 U.S.C. §§ 9613(k)(2)(B)(i-v) and 9617, EPA held a public comment period from July 6, 1994 through August 4, 1994. In addition, EPA held a public meeting on July 14, 1994 at the Souderton Municipal Building. Both the public comment period and the meeting were also announced in the notice of availability, and again on a notice on July 13, 1994. At this meeting, EPA presented the proposed plan, answered questions, and received comments. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is attached as part of this Record of Decision.

This decision document presents the selected final remedial action for operable unit 1 of the North Penn Area 1 Site in Souderton, Montgomery County, Pennsylvania, and presents the interim remedial action for operable unit 2 of the Site, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. The decision for this Site is based on the Administrative Record.

4. Scope and Role of Operable Units 1 & 2 Within Site Strategy

The remedial work at this Site has been divided into two separate planned remedial actions. The first operable unit is the source control operable unit (OU1). This Record of Decision (ROD) selects a final remedial action for OU1, which addresses the soil contamination that is contributing to ground water contamination. The second operable unit (OU2) is for ground water contamination. This ROD also selects an interim action to protect ground water. EPA will select a final remedial action for OU2 at a later date.

This ROD describes EPA's selection of the remedy for the soil contamination, and an interim remedy for the ground water treatment. Organic solvents (primarily PCE) were used in commercial operations over varying periods of time at each property, and is still being used at Gentle Cleaners. Through spills or discharges, these solvents contaminated the soils beneath the properties, and eventually migrated to the ground water. EPA and others have measured contamination in the ground water that exceeds the levels established in the Safe Drinking Water Act for public water supplies. Continued migration of the contamination remaining in the soil could exacerbate the ground water contamination problem, and could also result in direct exposure to anyone excavating the soil in the areas of contamination.

As described in the Proposed Plan, the remedial action objectives of this action are to remove the potential exposure risk from the contaminated soil, to eliminate the source of contamination migrating to ground water, and to prevent the spread of contaminated ground water.

5. Summary of Site Characteristics

EPA completed a Remedial Investigation/Feasibility Study (RI/FS) for OU1 and OU2 at the Site in June 1994. The purposes of the RI/FS were to:

- Characterize the hydrogeology of the Site, particularly with respect to the location and orientations of water-bearing fractures and the directions of ground water flow.

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- Define the nature and extent of contamination in ground water and soil, and define the Site boundaries.

- Determine which of the five identified properties contributed to the ground water contamination by identifying those properties with soil contamination

- Identify sources of contamination, including contaminated soil and underground storage tanks at the PRP facilities, and identify the nature and concentration of chemicals present at these sources.

- Identify the nature of contaminant migration at the Site, including pathways related to soil and ground water.

- Perform a risk assessment to evaluate any potential threat to human health and the environment.

- Evaluate potential interim action operable units to reduce contaminant migration and threats to human health and the environment.

- Develop and evaluate a range of final (for OU1) and interim (for OU2) remedial action alternatives to control any identified human health or environmental threats.

During the remedial investigation (RI) activities at the Site, EPA investigated the nature and extent of soil and ground water contamination by volatile organic compounds (VOCs). The results of the investigation are presented in this section.

The Site is in an area with a gently rolling topography, with low-lying ridges and hills. Most of the surface runoff in the area drains to the Schuylkill River, which flows into the Delaware River. The bedrock in this area is mostly reddish-brown shale interbedded with mudstone and siltstone. The bedrock is generally found from 5 to 15 feet below the ground surface, and the water table is between 5 and 20 feet below the top of the bedrock. In the immediate area of the site (along Green Street), the land slopes gently from the northeast to the southwest. Due to the topography and bedrock conditions, the ground water flow in the immediate area follows the slope of the surface (to the southwest).

Soils

The nature and extent of VOC contamination in soils at each of the five facilities were investigated to determine if any of the facilities may have been sources of contamination to the ground water and whether any of the facilities may continue to be sources. Soil samples were collected from soil borings at 2-foot intervals until bedrock was reached, and these samples were screened with an HNU photoionization detector (PID). Soil samples selected on the basis of the appearance and odor of the soil were analyzed in the field with a portable gas chromatograph (GC) in a close support laboratory (CSL). A smaller number of soil samples were sent for analysis through the EPA Contract Laboratory Program (CLP). The soil samples sent through the CLP program were selected to provide information on the areal extent of contamination at the facility and to quantify levels of contamination at the facility for use in the risk assessment.

For two of facilities, no significant contamination was found. At Lexco, no volatile contamination was found. At the former Standard Terry property, one sample result indicated an estimated value for PCE of 7 ppb. No other samples at this site revealed any volatile contamination. Therefore, these two properties will not be discussed further. For the remaining three sites, the results of the field GC analyses of the soil samples are presented in Table 1. Validated results of the CLP analyses of selected samples are summarized in Table 2. The complete results of the analyses are provided in the RI/FS report.

Acetone and methylene chloride were detected in most of the samples sent to the CLP. The presence of these VOCs was believed to be the result of contamination in the analytical procedures as demonstrated by detection of these compounds in the associated method blanks. All of the soil samples sent to the CLP contained one or both of these chemicals, even those samples from facilities where no other contaminants were detected.

a. Gentle Cleaners

At Gentle Cleaners, soil samples were collected from eight soil borings. Eleven soil samples were analyzed with the field GC for VOCs. Five of these samples and one duplicate were then sent through the CLP for analysis for VOCs and total organic compounds (TOCs).

The chemical analyses indicated that PCE is the primary contaminant at this facility. The soil boring locations and field GC results for PCE are shown in Figure 2, and the PCE results of the CLP-analyzed samples are presented in Figure 3. The highest concentrations of PCE were detected in samples from the 6- to 10-foot interval in the backyard of Gentle Cleaners. One of these samples was sent to the CLP and contained a PCE concentration of 300,000 micrograms per kilogram (μg/kg or parts per billion). This sample exceeded the detection limits of the field GC, as did a sample from boring GC-7; this exceedance is indicated by the term "off scale" in the figure. The highest concentration of PCE in a soil sample obtained from the yard next to Gentle Cleaners was from boring GC3, the nearest boring to the stone wall separating the two properties. Concentrations were low or below detection limits in surface soils at this facility.

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TCE was detected by the field GC at 1 µg/kg in one sample in the 8- to 10-foot interval at boring GC6—but none was detected in samples sent to the CLP. No other VOCs were detected in soil samples by the field GC.

A leaf sample was collected from the GC-7 location when it was noticed that the leaves had a strong solvent smell, and VOCs registered strongly on the HNU. The sample was analyzed using the field GC. No PCE was detected in the sample but several compounds not identifiable by the field GC were present.

Contaminant levels found in soils during this investigation suggest that the extent of soil contamination at this facility is limited. The highest levels were found behind the cleaners, and some elevated levels were found in the adjoining yard. But no VOCs were detected in soil samples taken south of the cleaners, at borings GC1 and GC2, along a probable path of contaminant migration, down the gentle slope of the yard. Access limitations prevented obtaining samples southwest and west of the cleaners.

The concentration of 300,000 µg/kg of PCE detected in one sample at this facility appears to be the result of the spill of 75 gallons of PCE that reportedly occurred at this facility. This liquid would have seeped down into the soil and would have been adsorbed to some degree onto the soil particles.

b. Granite Knitting Mills

The EPA investigated soil contamination at Granite Knitting Mills by drilling 14 soil borings and collecting samples from various depths within each boring. All of the soil borings were drilled through asphalt cover and the underlying soils to the top of bedrock. Twenty-four soil samples were analyzed with the field GC, and eight samples were sent to the CLP.

The results of the field GC data indicate that the contaminants in the soils associated with this facility were primarily PCE. The soil boring locations and field GC sampling results for PCE are presented in Figure 4. Selected samples were sent through the EPA CLP program for analysis and documentation. The PCE results of the CLP sampling are presented in Figure 5.

Boring GKM-12 is not shown in either Figure 4 or 5. Boring GKM-12 is located in the alley at the northeast corner of the mills property (off of the map on the right-hand side) to help determine if any contamination was moving down the hill from Gentle Cleaners and running into the alley. Soil samples were collected to auger refusal at 4 feet below the surface. The 2-to-4 foot sample was analyzed by the field GC and through the CLP. The field GC detected PCE at 2 µg/kg. The CLP sample had a detection limit of 11 µg/kg and did not detect PCE in the sample.

TABLE 1
NORTH PENN AREA 1 SOIL ANALYSIS
FIELD GC RESULTS

Sample Identification	Depth (feet)	Detected Compounds	Concentrations (μg/kg)
GRANITE KNITTING MILLS			
GKM2-S2	2-4	Tetrachloroethylene	19
GKM2-S5	8-10	Tetrachloroethylene	152
GKM1-S4	6-8	ND	
GKM1-S3	4-6	Tetrachloroethylene	4
GKM1-S1	0-2	Tetrachloroethylene	3
GKM6-S4	6-8	Tetrachloroethylene	45
GKM6-S4D	6-8	Tetrachloroethylene	37
GKM5-S5	8-10	Tetrachloroethylene	4
GKM6-S6	10-12	Tetrachloroethylene	4
GKM5-S3	4-6	Tetrachloroethylene	9
GKM5-S4	6-8	Tetrachloroethylene	10
GKM4-S3	4-6	cis-1,2-Dichloroethylene	3.2
		Trichloroethylene	2.2
		Tetrachloroethylene	52
GKM7-S3	4-6	Tetrachloroethylene	7
GKM10-S2	2-4	Tetrachloroethylene	15
GKM3-S2	2-4	Tetrachloroethylene	6
GKM3-S4	6-8	ND	
GKM8-S4	6-8	Trans-1,2-Dichloroethylene	175
		cis-1,2-Dichloroethylene	7
		Trichloroethylene	53
		Tetrachloroethylene	off-scale

TABLE 1
NORTH PENN AREA 1 SOIL ANALYSIS
FIELD GC RESULTS

Sample Identification	Depth (feet)	Detected Compounds	Concentrations (µg/kg)
GKM14-S1	0-2	ND	
GKM14-S2	2-4	ND	
GKM11-S1	0-2	ND	
GKM13-S1	0-2	Trichloroethylene	4
		Tetrachloroethylene	582
GKM12-S2	2-4	Tetrachloroethylene	2
GKM11-S2	2-4	Tetrachloroethylene	1
GKM12-S1	0-2	ND	
GKM Storm Drain	0-1	ND	
GENTLE CLEANERS			
GC5-S1	0-2	ND	
GC3-S3	4-6	Tetrachloroethylene	1449
GC7-S2	2-4	ND	
GC7-S4	6-8	Tetrachloroethylene	off-scale
GC1-S2	2-4	Tetrachloroethylene	2
GC6-S5	8-10	Trichloroethylene	1
		Tetrachloroethylene	off-scale
GC4-S1	0-2	ND	
GC8-S3	4-6	Tetrachloroethylene	73
GC2-S1	0-2	ND	
GC6-S6	10-12	Tetrachloroethylene	28
GC8-S2	2-4	Tetrachloroethylene	53
GC-TS	0-0.5	Tetrachloroethylene	5

TABLE 1 NORTH PENN AREA 1 SOIL ANALYSIS FIELD GC RESULTS Page 3			
Sample Identification	**Depth (feet)**	**Detected Compounds**	**Concentrations (µg/kg)**
PARKSIDE APARTMENTS			
PA2-S2	2-4	Trans-1,2-Dichloroethylene	0
		cis-1,2-Dichloroethylene	16
		Trichloroethylene	50
		Tetrachloroethylene	193
PA3-S2	2-4	Tetrachloroethylene	3
PA8-S4	6-8	Tetrachloroethylene	5
PA4-S3	4-6	cis-1,2-Dichloroethylene	7
		Trichloroethylene	5
		Tetrachloroethylene	160
PA5-S3	4-6	Tetrachloroethylene	21
PA7-S6	10-12	Tetrachloroethylene	23
PA6-S4	6-8	Trichloroethylene	4
		Tetrachloroethylene	1787
PA7-S3	4-6	Tetrachloroethylene	5
PA10-S2	2-4	ND	
PA9-S3	4-6	Tetrachloroethylene	17
PA5-S2	2-4	Tetrachloroethylene	32
PA8-S1	0-2	Tetrachloroethylene	3

NOTE: ND = None detected.

Table 2
ANALYSES OF ORGANIC COMPOUNDS IN SOILS
CLP RESULTS

Gentle Cleaners

Sample No.	GC-3	GC-5	GC-6	GC-7	GC-7 (DUP)	GC-8
Depth (ft)	4-6	0-2	8-10	2-4	2-4	4-6
Compound						
1,2-DCA (μg/kg)	<13	<12	<11	<11	<12	<12
MEK (μg/kg)	<13	<12	<11	<11	<12	<12
Acetone (μg/kg)	43 B	12 B	27 B	7 B	14 B	48 B
MC (μg/kg)	17 B	18 B	15 B	14 B	12 B	18 B
PCE (μg/kg)	100	23 J	300,000	<11	<12	190
Toluene (μg/kg)	<13	<12	<11	<11	<12	<12
TCE (μg/kg)	<13	<12	<11	<11	<12	<12
TOC (mg/kg)	1,490	2,450	21,800	20,800	25,000	1,680

Granite Knitting Mills

Sample No.	GKM-3	GKM-4	GKM-5	GKM-7	GKM-8	GKM-10	GKM-12	GKM-13
Depth (ft)	2-4	4-6	6-8	4-6	6-8	2-4	2-4	0-2
Compound								
1,2-DCA (μg/kg)	<12	<11	<12	<12	45	<12	<11	<12
MEK (μg/kg)	17 B	<11	<12	<12	<12	<12	<11	<12
Acetone (μg/kg)	25 B	24 B	22 B	31 B	21 B	13 B	12 B	20 B
MC (μg/kg)	12 B	11 B	11 B	12 B	12 B	14 B	33 B	53 B
PCE (μg/kg)	<12	27	6 J	8 J	6,900	6 J	<11	1,000
Toluene (μg/kg)	<12	3 J	<12	<12	<12	12 L	<11	<12
TCE (μg/kg)	<12	<11	<12	<12	64	<12	<11	<12
TOC (mg/kg)	766	4,640	548	2,660	5,320	3,580	1,340	25,000

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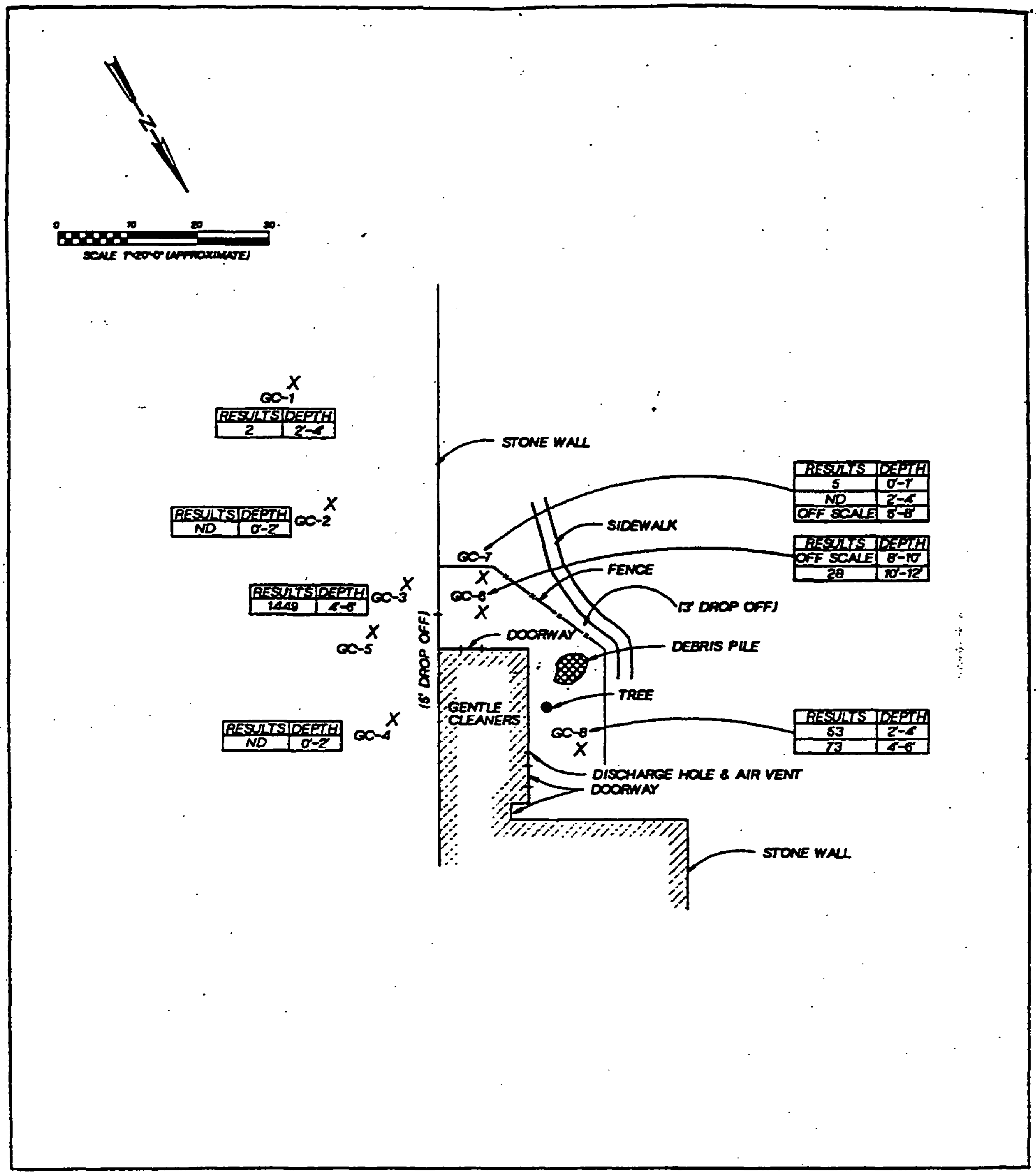
Table 2
ANALYSES OF ORGANIC COMPOUNDS IN SOILS
CLP RESULTS

Parkside Apartments							
Sample No.	PA-2	PA-3	PA-5	PA-7	PA-8	PA-10	PA-10 (DUP)
Depth (ft)	2-4	2-4	4-6	10-12	6-8	2-4	2-4
Compound							
1,2-DCA (μg/kg)	4 J	<12	<12	<11	<12	<12	<12
MEK (μg/kg)	<12	<12	<12	<11	<12	<12	<12
Acetone (μg/kg)	<12	8 B	9 B	15 B	18 B	12 B	11 B
MC (μg/kg)	48 B	38 B	34 B	53 B	17 B	13 B	15 B
PCE (μg/kg)	99	<12	5 J	120 J	56	<12	<12
Toluene (μg/kg)	<12	<12	<12	<11	<12	<12	<12
TCE (μg/kg)	29	<12	<12	<11	<12	<12	<12
TOC (mg/kg)	4,520	2,540	6,050	15,800	7,990	4,160	4,530



LEGEND

X SOIL BORING LOCATIONS

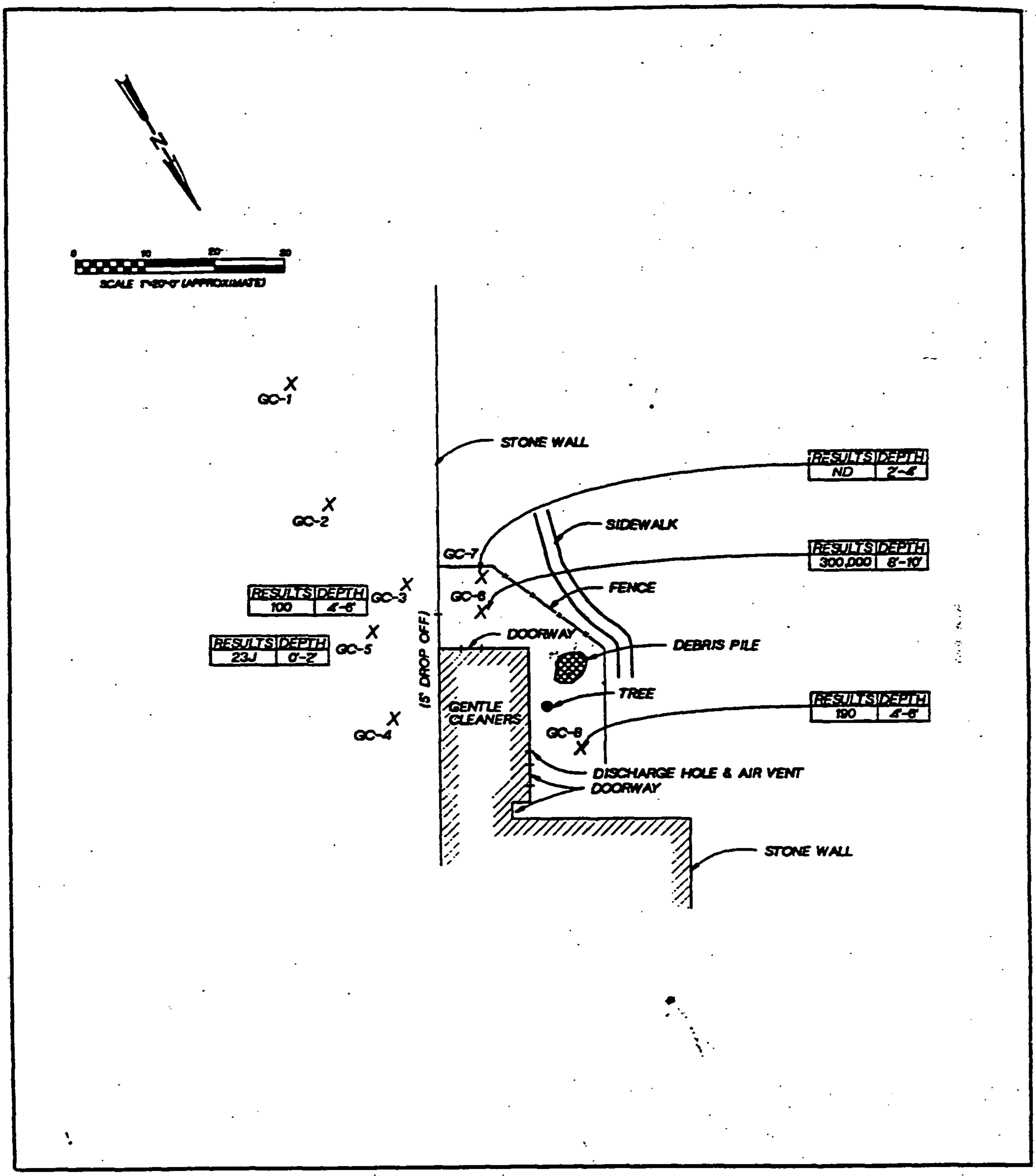
ND NOT DETECTED

ALL UNITS IN µg/kg

PCE CONCENTRATIONS FROM FIELD GC ANALYSES GENTLE CLEANERS

North Penn Area 1
Phase II RI/FS

FIGURE 2



LEGEND

X SOIL BORING LOCATIONS

ND NOT DETECTED

ALL UNITS IN µg/kg

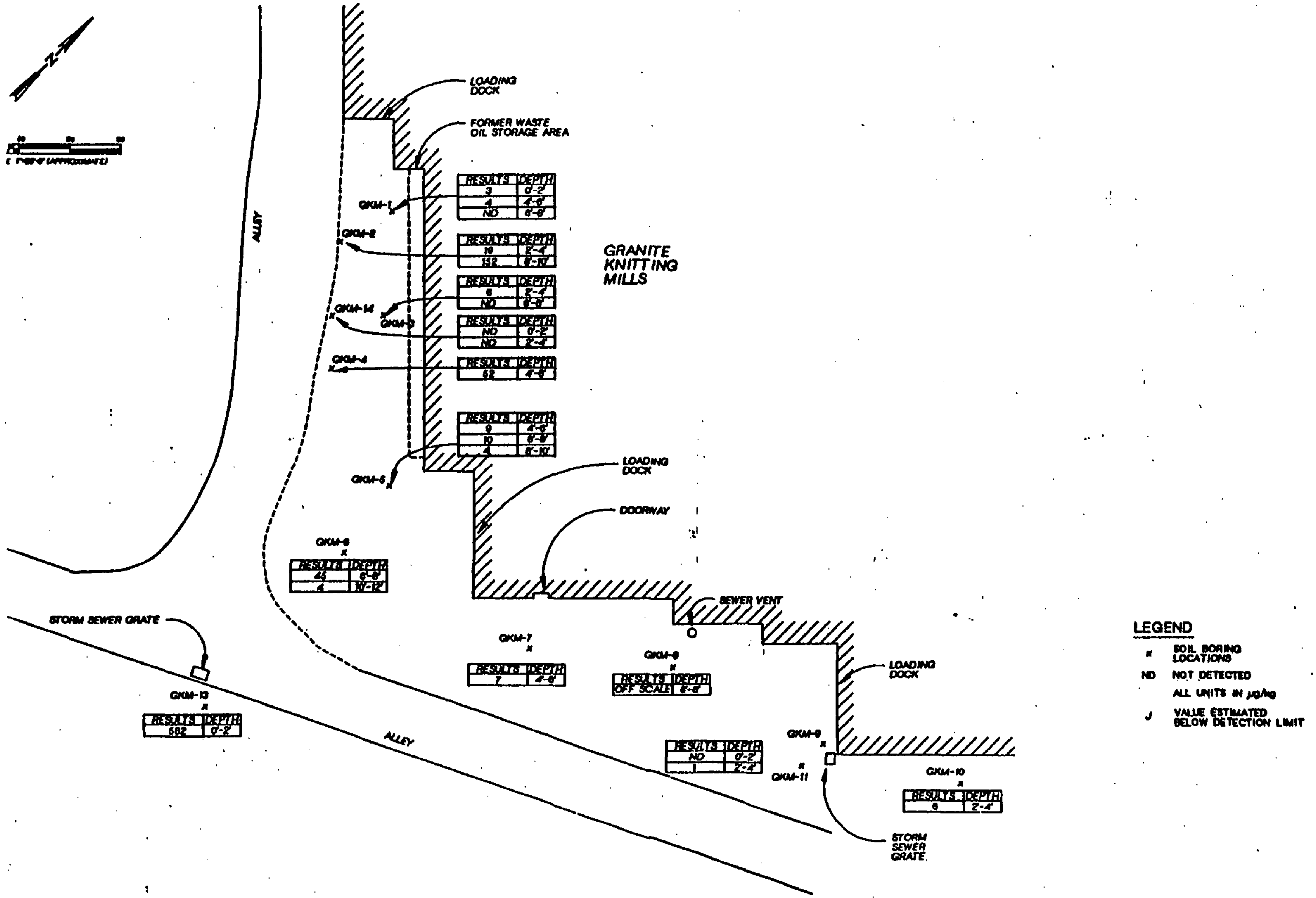
J VALUE ESTIMATED BELOW DETECTION LIMIT

FIGURE 3

PCE CONCENTRATIONS FROM CLP ANALYSES GENTLE CLEANERS

North Penn Area 1

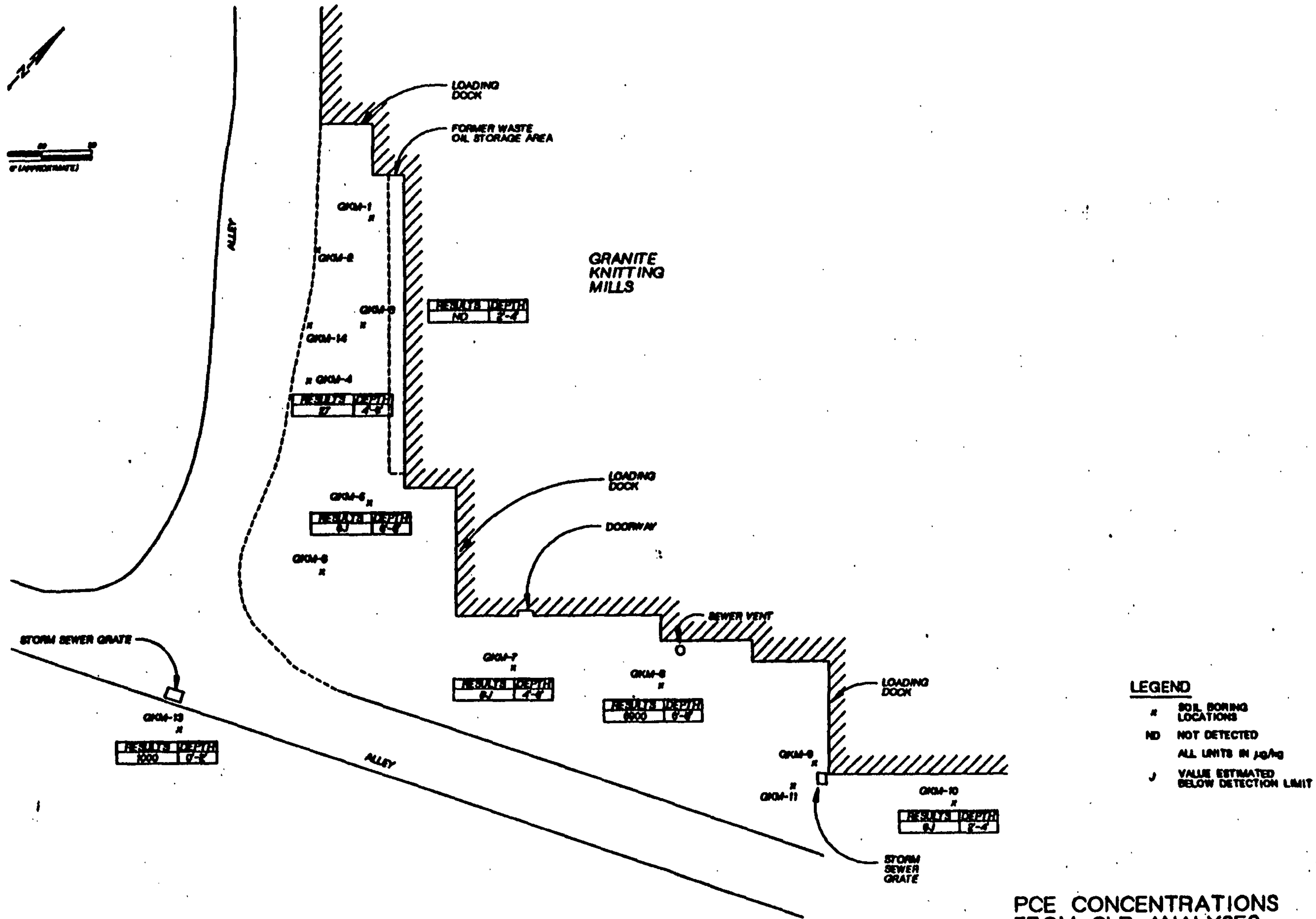
Phase II RI/FS



PCE CONCENTRATIONS
FROM FIELD GC ANALYSES
GRANITE KNITTING MILLS
North Penn Area 1

FIGURE 4

AR301464



PCE CONCENTRATIONS
FROM CLP ANALYSES
GRANITE KNITTING MILLS
North Penn Area 1

FIGURE 5

AR301465

The highest concentration of detected PCE at the facility was at boring GKM-8; 6,900 µg/kg were detected by the CLP, and the sample exceeded the field GC detection limit. Most other concentrations were low, except at boring GKM-13, where 1,000 µg/kg of PCE were detected in the surface sample (below asphalt) by the CLP. This location is near a storm sewer grate, suggesting the possibility that contamination may move into the storm sewer with surface runoff. No VOCs were detected in a sample of soil obtained from the northern storm drain and analyzed by the field GC (sample GKM storm drain).

Surface water samples were collected from the unnamed tributary to Skippack Creek below the outfall of this storm sewer when it was discharging. The surface water samples were analyzed with the field GC, and no VOCs were detected.

The soil samples collected from the former solvent storage area (along the southwest side of the building) found PCE levels varying from not detected to 152 µg/kg. The PCE levels found in boring GKM-8 were significantly higher.

Other VOCs were detected by the field GC and the CLP: cis-1,2-DCE (two detections), trans-1,2-DCE (one detection), 1,2-DCA (one detection), methyl ethyl ketone (one detection), toluene (two detections), and TCE (three detections). The highest levels of most of these other VOCs were detected by the field GC in the 6- to 8-foot sample from GKM-8; trans-1,2-DCE at 175 µg/kg, cis-1,2-DCE at 7 µg/kg, and TCE at 53 µg/kg; 1,2-DCA also was detected at 45 µg/kg by the CLP. The two other field GC detections of other VOCs were below 5 µg/kg. Acetone and methylene chloride also were reported as being detected by the CLP in all of the samples. (As noted above, these are believed to be due to contamination introduced in the lab or sample containers.)

The results of soil analyses for VOCs at this facility suggest that the highest levels of contamination are restricted to the southeast side of the building. The highest level of contamination in this area was found at the interval from 6 to 8 feet. Concentrations at the surface were low to nondetectable.

c. Parkside Apartments

EPA investigated the Parkside Apartments facility by drilling and sampling of 10 soil borings in the lawn behind the building. Twelve selected soil samples were analyzed in the field using a field GC. Six samples and one duplicate were then sent through the CLP. On the basis of the known past property use, EPA located the soil borings to provide coverage of the area where contamination may have occurred.

The analyses of the soil samples found contamination to be primarily PCE. The results of the field GC analyses for PCE are presented in Figure 6. The results of the CLP analyses for PCE are presented in Figure 7. The levels of PCE observed ranged from not detected to 1,787 μg/kg on the field GC, and not detected to 120 μg/kg in the CLP data. The highest levels of PCE were located next to the building at borings PA-2, PA-4, and PA-6. Away from the building, the levels of PCE were much lower.

Cis-1,2-DCE (two detections), trans-1,2-DCE (one detection), TCE (three detections), and 1,2-DCA (one detection) also were detected at the facility. All of these other VOC detections were in samples obtained from borings PA-2, PA-4, and PA-6, next to the building. The highest concentration of TCE detected was 50 μg/kg in a 2- to 4-foot sample in boring PA-2. Acetone and methylene chloride also were reported as being detected by the CLP in most of the samples. (As noted above, these are believed to be due to contamination introduced in the lab or sample containers.)

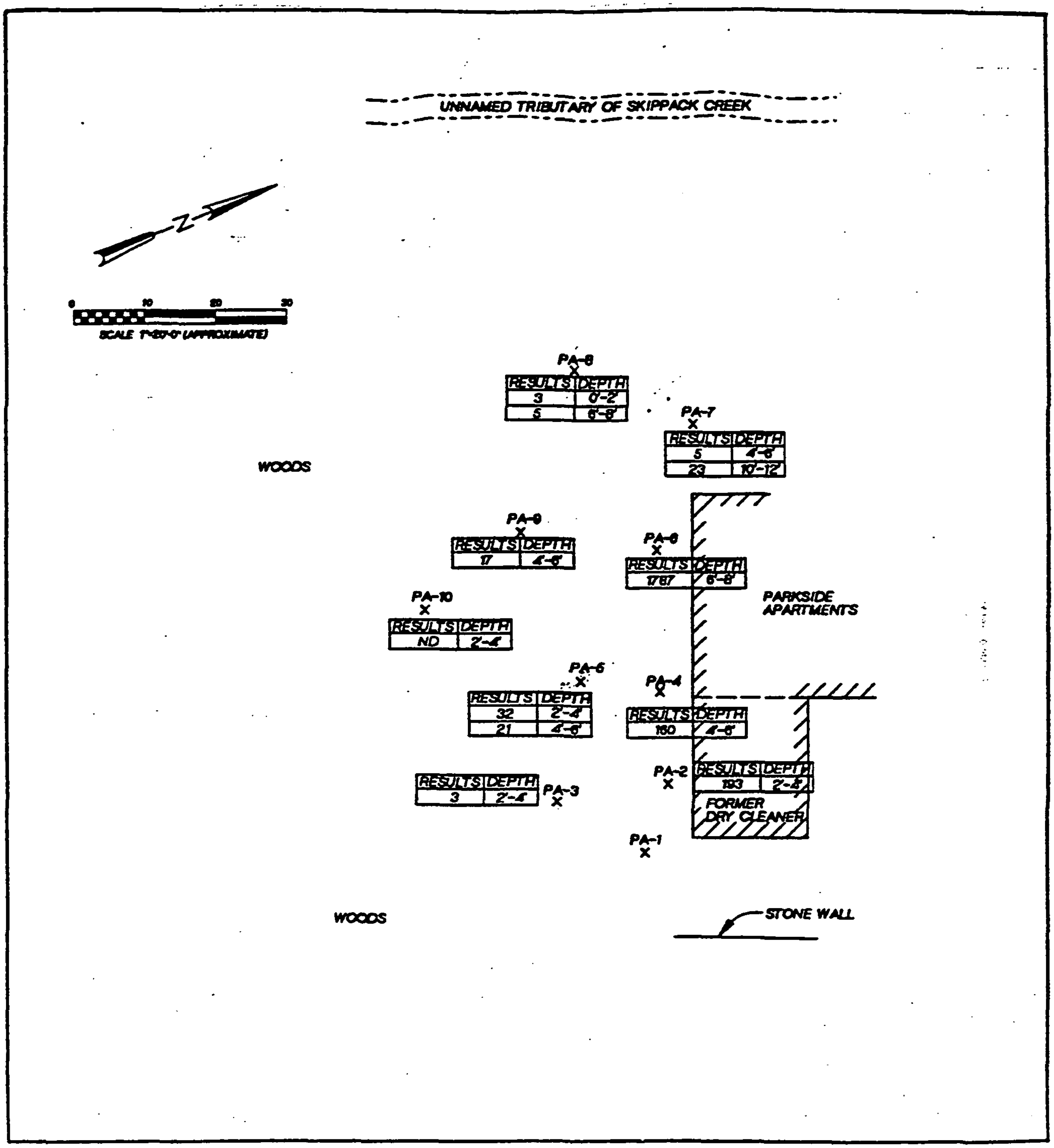
Ground Water

VOCs, particularly PCE and TCE, have been detected in ground water at the Site. The ground water was sampled during the RI at several wells in and near the Site. The wells sampled during this investigation met one or more of the following criteria:

- They were identified during the well inventory as drilled wells.
- They had contaminants detected in previous investigations at the Site.
- They are currently used as drinking water supply wells.
- They are located within 1/2 mile of the Site boundaries.
- The owner allowed them to be sampled.

The results of the ground water sampling and CLP analyses are presented in Table 3 and in Figure 8. The complete results of CLP analyses are presented in the RI/FS report. The highest levels of contamination occur in the wells at the center of the Site, including the GKM well, NPWA wells S-9 and S-10, and the Souderton Borough well (well 679), which had PCE concentrations ranging from less than 1 to 5 micrograms per liter (μg/l or parts per billion). The only other bedrock well exhibiting detectable levels of PCE was residential well R-2, with a concentration of 0.1 μg/l.

The greatest variety of contaminants was detected in the GKM well, followed by the well at the Mennonite Home for the Aged (well R-10). The fact that the well at the Home did not contain PCE and had some other differences in the make-up of the VOCs



LEGEND

× SOIL BORING LOCATIONS

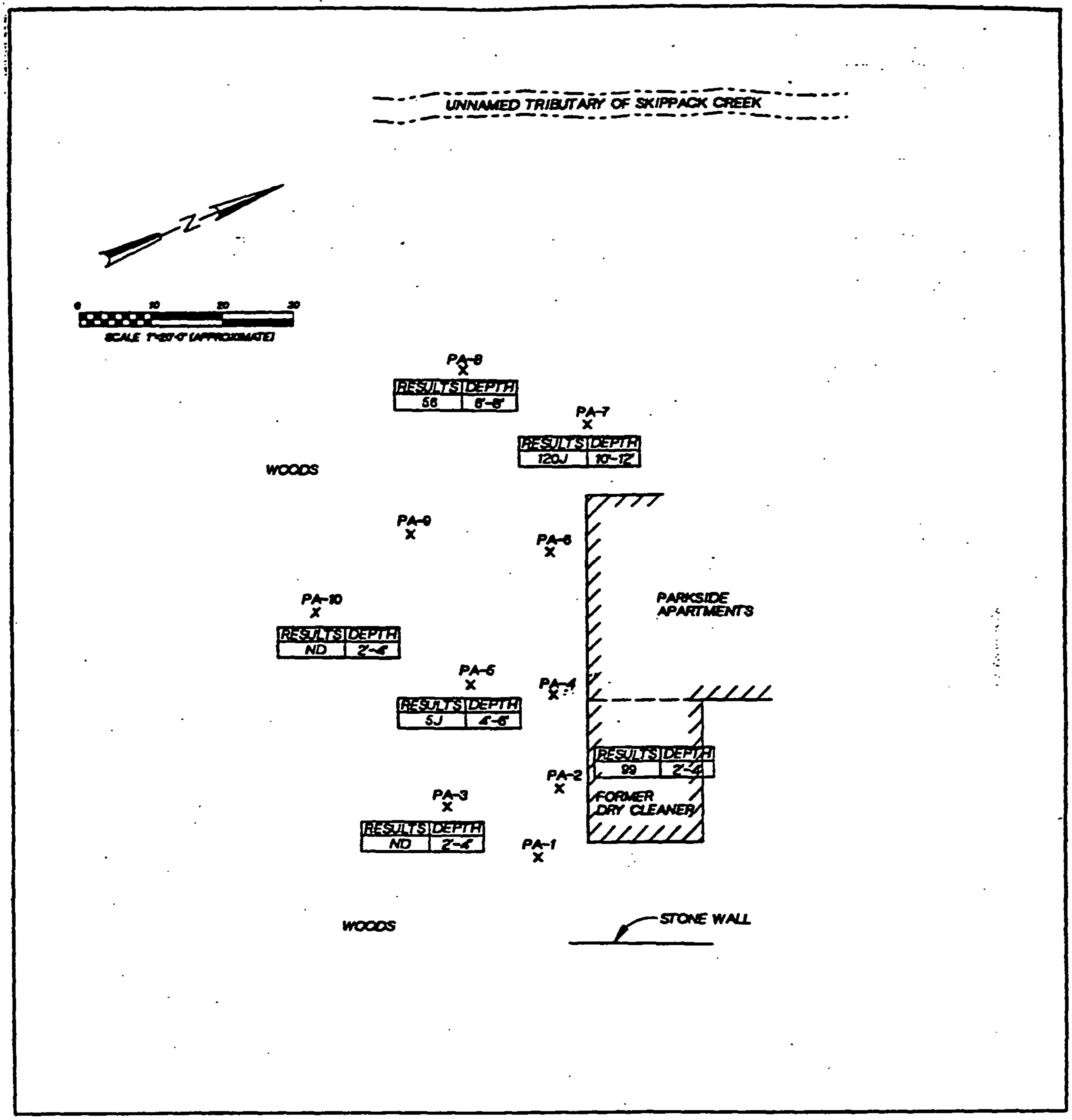
ND NOT DETECTED

ALL UNITS IN µg/kg

PCE CONCENTRATIONS
FROM FIELD GC ANALYSES
PARKSIDE APARTMENTS
North Penn Area 1

FIGURE 6

AR301468



LEGEND

x SOIL BORING LOCATIONS

ND NOT DETECTED

ALL UNITS IN µg/kg

J VALUE ESTIMATED BELOW DETECTION LIMIT

PCE CONCENTRATIONS FROM CLP ANALYSES PARKSIDE APARTMENTS
North Penn Area 1

FIGURE 7

AR301469

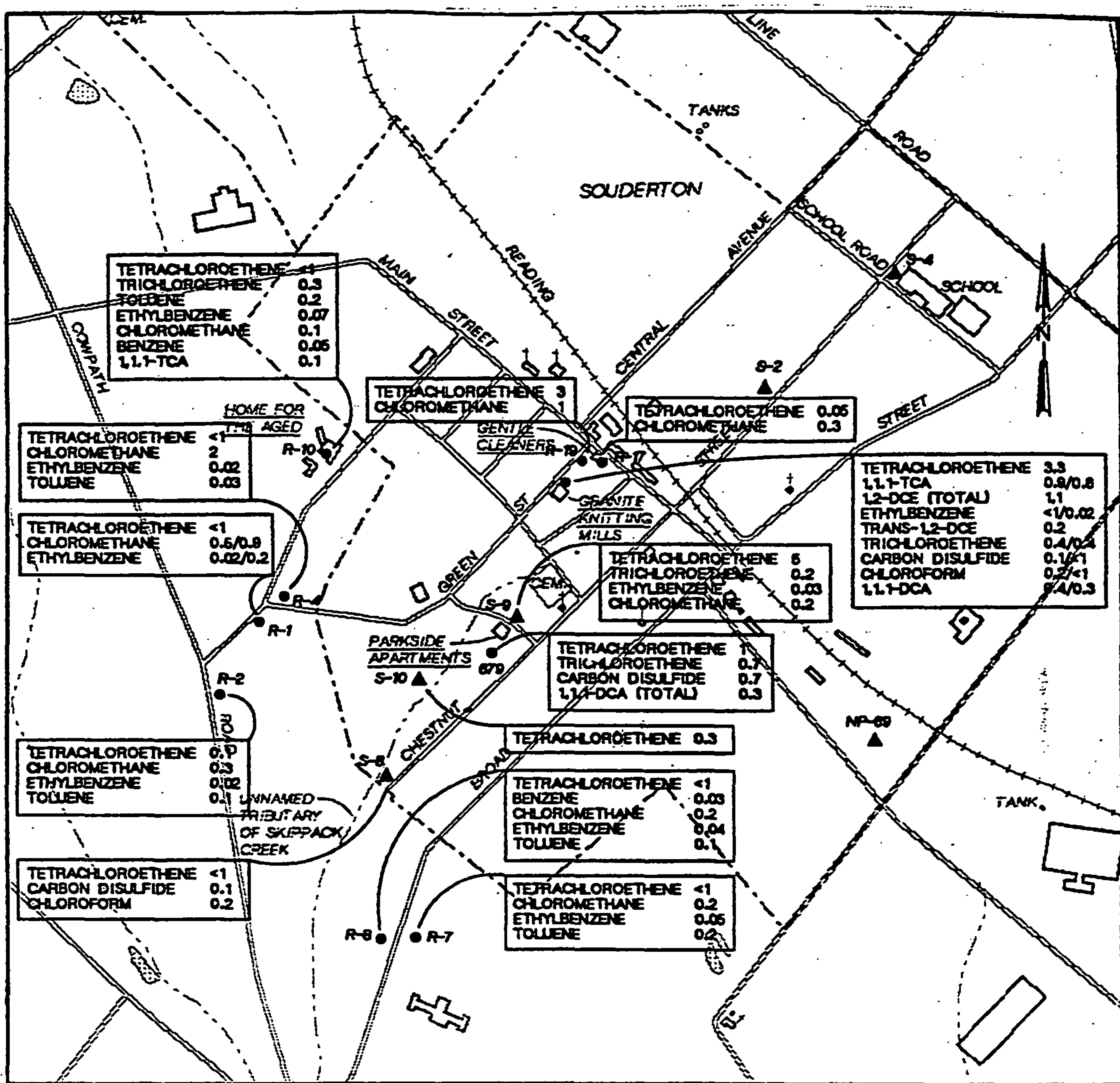
Table 3
ANALYSES OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES OBTAINED FROM RESIDENTIAL, INDUSTRIAL, AND MUNICIPAL WELLS

Well ID	R-1	R-1	R-2	R-4	R-7	R-8	Mennonite Home R-10	R-17	R-19	NPWA S-8	NPWA S-9	NPWA S-10	GKM		Souderton Borough (679)
Sample Number	GW1-01	GW1-02 (DUP)	GW6-01	GW2-01	GW8-01	GW7-01	GW9-01	GW4-01	GW3-01	S-8	GW5-01	S-10	GW10-01	GW11-01 (DUP)	GW12-01
Compound															
1,1,1-TCA (μg/l)	<1	<1	<1	<1	<1	<1	0.1 J	<1	<1	<1	<1	<1	0.9 J	0.8 J	<1
1,1-DCA (μg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.4 J	0.3 J	<1
Benzene (μg/l)	<1	<1	<1	<1	<1	0.03 J	0.05 J	<1	<1	<1	<1	<1	<1	<1	<1
BDCM (μg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.1 J	<1	<1	0.1 J	0.1 J	<1
Carbon disulfide (μg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.1 J	<1	<1	0.1 J	<1	0.7 J
Chloroform (μg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.2 J	<1	<1	<1	0.2 J	<1
Chloromethane (μg/l)	0.6 J	0.9 J	0.3 J	2 J	0.2 J	0.2 J	0.1 J	0.3 J	1 J	<1	0.2 J	<1	<1	<1	<1
1,2-DCE (total) (μg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1	0.3 J
Ethylbenzene (μg/l)	0.02 J	0.02 J	0.02 J	0.02 J	0.05 J	0.04 J	0.07 J	<1	<1	<1	0.03 J	<1	<1	0.02 J	<1
PCE (μg/l)	<1	<1	0.1 J	<1	<1	<1	<1	0.05 J	3	<1	5	0.3 J	3	3	1
Toluene (μg/l)	<1	<1	0.1 J	0.03 J	0.2 J	0.1 J	0.2 J	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-DCE (μg/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.2 J	<1	<1
TCE (μg/l)	<1	<1	<1	<1	<1	<1	0.3 J	<1	<1	<1	0.2 J	<1	0.4 J	0.4 J	0.7 J

Notes:
DCA = Dichloroethane
DCE = Dichloroethene
TCA = Trichloroethane
PCE = Tetrachloroethene
TCE = Trichloroethene
BDCM = Bromodichloromethane
DUP = Duplicate sample

J indicates that the sample contains the compound at an estimated concentration.

AR301470



SOURCE: U. S. GEOLOGICAL SURVEY 7-1/2 MINUTE QUADRANGLE MAP FOR TELFORD, PA.

0 600 1200 1800

SCALE: 1"=1200'

LEGEND

▲ S-2 — NPWA WELL

● R-X — RESIDENTIAL WELL

-·-·- — BOROUGH AND TOWNSHIP BOUNDARIES

NOTES:

1. DATA ARE IN µg/l
2. MULTIPLE RESULTS FOR ONE WELL AND COMPOUND INDICATE DUPLICATE.

RESULTS OF ANALYSES OF GROUNDWATER FOR VOCS
North Penn Area 1

FIGURE 7

detected suggests that the Home well may not be contaminated by the same plume as the other wells at the Site.

Other VOCs identified in ground water from the 13 wells sampled were benzene (two detections), bromodichloromethane (two detections), carbon disulfide (three detections), chloroform (two detections), chloromethane (nine detections), ethylbenzene (eight detections), and toluene (five detections). These VOCs were distributed widely among the wells, without being limited to either municipal wells only or residential wells only. It should be noted that except for 2 µg/l of chloromethane estimated in a sample from well R-4, the concentrations of all of these VOCs are less than or equal to 1 µg/l.

Residential wells R-17 and R-19 are both shallow dug wells and do not therefore characterize the bedrock ground water quality. However, because of their proximity to Gentle Cleaners, both have probably been contaminated by the cleaners as a result of migration of contaminants in the soil. (These wells are not used for drinking water supplies, but were sampled to provide information on the characteristics of the shallow ground water in these areas.)

Long-term data on VOC contamination in ground water are available from NPWA wells S-2, S-4, S-8, S-9, and S-10. These data are provided in the RI. PCE levels in well S-2 have remained around 0.5 to 0.6 µg/l for several years. PCE concentrations in well S-4 have varied widely between about 2 and about 5 µg/l and showed a general decline during 1991. These wells were not resampled during the RI.

Wells S-8, S-9, and S-10 were resampled during the RI. PCE levels in well S-8 remained at about the detection limit of 0.5 µg/l for several years but in 1990 and 1991 rose to values on the order of about 1 µg/l. The RI sampling detected a concentration of about 0.3 µg/l, suggesting that the level may be declining. In well S-10, the PCE level has varied between about 0.5 and 1.5 µg/l over time, higher than the 0.3 µg/l detected during the RI. TCE and 1,1,1-TCA detected in well S-10 in earlier sampling events were not detected during the RI.

In well S-9, the PCE level was about 10 to 13 µg/l during 1986 and 1987, the period of record for this well. The RI sampling detected only 5 µg/l, suggesting that the concentration has declined since then. However, sampling of straddle-packed intervals in the well during the RI suggests that the concentration of 5 µg/l may not be representative of the level of contamination in the well. This issue is discussed in more detail in the following paragraphs where the straddle-packer test results are presented. Concentrations of TCE and 1,1,1-TCA in this well were on the order of 0.5 µg/l in 1986 and 1987. TCE was detected at 0.2 µg/l, and 1,1,1-TCA was not detected in the

AR301472

well when the entire well was sampled during the RI. The level of TCE detected in a sample from the entire well was about that detected during the straddle-packer tests.

Ground water samples were collected from discrete intervals in the GKM well and in well S-9. The discrete samples were obtained by the use of straddle packers. Packers are balloon-like devices, two of which are placed in the well at selected intervals and pressurized, isolating the space in between them. Samples from this space are removed through tubes in the packers, allowing the characterization of ground water in just that interval of the well.

The results of the packer sampling indicate that the contamination extends throughout the total depths of both wells, but that there are variations in contaminant levels. The samples collected from well S-9 exhibited contaminant levels ranging from 8 to 17 $\mu g/l$ of PCE. TCE also was detected in the samples from well S-9 wells at levels up to 0.3 $\mu g/l$. The fact that the concentration of PCE was as high as 8 to 17 $\mu g/l$ in each of the five packed intervals suggests that the sample of the entire well may not have been representative of the level of contamination in the entire well. It is possible that the location of the pump used to purge the well drew water from the vicinity of a fracture or group of fractures that provided relatively clean water to the well. The well was sampled with a bailer lowered to this same interval. The original pump that was installed in the well was probably used for the sampling in 1986 and 1987. This pump was removed from the well so that packer testing could be performed. The pump used for the purging was set higher in the well, and the sample was obtained from a higher interval. This difference in sampling technique may account for the difference in the concentrations detected.

A ground water sample obtained from the GKM well in 1986 reportedly contained 250 $\mu g/l$ of 1,1,1-TCA, 33.5 $\mu g/l$ of PCE, 12.2 $\mu g/l$ of TCE, and lower concentrations of other VOCs. The sample obtained from the packed intervals of the well during the RI contained almost no 1,1,1-TCA or TCE and variable levels of PCE, the latter ranging from 330 $\mu g/l$ at the top interval to 16 $\mu g/l$ in a lower interval. These data suggest that the overall concentrations of VOCs in this well have declined over time.

The highest concentrations of most VOCs in the GKM well were found in a sample collected from the uppermost interval. During video logging of the well, water was observed to be running into the well borehole from fractures located below the bottom of the casing but above the water level in the well; the fractures were located at a depth of about 22 feet below the ground surface. The water observed to be entering the well from these fractures is probably surface infiltration or shallow ground water that has passed through contaminated soil at Gentle Cleaners or other facilities, migrated to the bedrock surface, and entered fractures in the bedrock, finally traveling to the GKM well. The topography in this area slopes from Gentle Cleaners down towards the GKM property and beyond, and the ground water above Gentle Cleaners has much lower levels of contamination. The high PCE levels found at Gentle Cleaners could easily be gradually dissolving in the shallow water migrating through this area. Contamination entering the well from these fractures would contaminate the entire well.

The sample of the entire GKM well was collected more than 24 hours into the 72-hour pumping test performed in the well. By that time the well had been purged of at least three well volumes. Samples also were collected periodically throughout the test and analyzed with the field GC to determine trends in contaminant levels.

In all cases there is a sharp initial decline in concentration, followed by a gradual decline or a tendency to stabilize in most cases. An exception is an increase in 1,1-DCE late in the test. It should be noted that the PCE concentration had declined to a value on the order of 6 $\mu g/l$ by the end of the test and had dropped from an initial level of around 30 $\mu g/l$ to about 10 $\mu g/l$ within a few hours of the beginning of the test. This decline and general stabilization in PCE concentration suggests that the sample obtained from the entire well is representative of the quality of the ground water in the vicinity of the well, and that the packer tests discussed above reflect the affects of the contamination migrating into the well from the properties immediately adjacent to the well.

The concentrations of VOC contaminants detected in the ground water samples collected in this RI are so low that there is no evidence that DNAPLs are currently affecting ground water quality at the Site. The concentrations observed are only a very small percentage of the solubility limits of the VOCs of concern. During the periodic sampling of the ground water being discharged from the GKM well, the concentration of PCE stabilized but at a concentration of only about 6 $\mu g/l$, well below the solubility limit of PCE. Therefore, the presence of DNAPLs was not indicated by this sampling.

In summary, contamination by VOCs of the ground water at the Site still exists but may have declined in concentration over time. PCE was detected at or above the MCL of 5 $\mu g/l$ only in well S-9. PCE was detected, in this investigation, at a lower concentration in production well S-10 and not detected at all in production well S-8. PCE was detected in NPWA sampling in 1991 at less than 1 $\mu g/l$. Contamination from the Area 1 plume may have affected a residential well southwest of the Site. High concentrations of VOC contaminants are still entering the ground water, at least at the location of the GKM well, although they are diluted in the aquifer to much lower levels.

There is no definitive evidence for the presence of DNAPLs in the ground water at the Site. Even a concentration of PCE at 330 µg/l, detected in packer sampling at the GKM well, is only 0.2 percent of the solubility of PCE. The solubility of pure-phase PCE in water is approximately 150,000 µg/l. Levels at 1% or higher of the solubility for PCE would be indicative of the possible presence of DNAPLs in the ground water. No contamination at this level (1,500 µg/l) were found. However, it is known that a spill of PCE occurred at Gentle Cleaners that probably introduced DNAPLs to the subsurface, and the presence of DNAPLs would explain why PCE was detected throughout the entire depths of the GKM well and well S-9, although at concentrations that are only a small fraction of the solubility of PCE.

6. Summary of Site Risks

This section provides a summary of the analysis of potential risks to human health and the environment from this contamination in the absence of any remedial action. A risk assessment was completed as part of the Remedial Investigation/Feasibility Study. The results of the risk assessment were used to help determine whether remediation is necessary, to help provide justification for performing remedial action, and to assist in determining what exposure pathways need to be remediated. The following presents a summary of the results of the assessment.

Selection of Contaminants of Concern

The risk from only VOCs was quantified because there were no data on any other potential contaminants. The 14 contaminants identified as primary contaminants of toxicological or environmental concern and selected for baseline risk assessment are listed in Table 4. The chemicals of concern were selected on the basis of the following criteria:

- The frequency of detection in soil and water (if a contaminant was detected in fewer than 5 percent of the samples, it was dropped as a contaminant of potential concern.)

- Estimated concentrations of certain compounds

The soil at the Site was separated into three distinct areas, specifically: Gentle Cleaners, Parkside Apartments, and Granite Knitting Mills. The ground water, however, was treated the same for the entire Site.

Table 4 CONTAMINANTS OF CONCERN
Acetone
Benzene
Bromodichloromethane
Carbon disulfide
Chloroform
Chloromethane
1,1-Dichloroethane
Cis/trans-1,2-Dichloroethene
Ethylbenzene
Methylene chloride
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
Trichloroethene

Toxicity Assessment

In general, toxicity assessment has two steps. The first step, hazard identification, is the process of determining what adverse health effects, if any, could result from exposure to a particular chemical. The second step, dose-response evaluation, quantitatively examines the relationship between the level of exposure and the incidence of adverse health effects in an exposed population.

Exposure Assessment

On the basis of RI data, pathways were identified through which human population may be exposed now or in future to the contaminants of concern. These pathways were evaluated in the baseline risk assessment under current and potential land-use conditions. A number of potential human exposure pathways have been identified at the Site. These include:

- Soil - Existing and potential future ingestion and dermal absorption of contaminants from surface and subsurface soil
- Ground Water - Potential future residential use with ingestion, dermal absorption, and inhalation of volatilized compounds
- Air - Existing and potential future inhalation of volatiles from contaminated soil

Table 5 presents the exposure pathways addressed in the baseline risk assessment, highlighting which pathways were assessed quantitatively and which were assessed qualitatively. Subsurface soil was included as a potential exposure pathway for future residents because excavation of soil, such as for the installation of home foundations, could occur. Such excavation could bring subsurface soil to the surface, allowing direct exposure to the contaminants that have been detected in subsurface soil.

Quantification of Exposure

Exposure pathways for current and future use were evaluated separately.

<u>Current Use</u>

Soil - Residents and workers can come into contact with soil through incidental ingestion and or dermal exposure. Exposure to subsurface soil can occur during construction (worker) and after construction (workers and residents) if contaminated soils are left on the surface. The risk to residents is expected to be higher from exposure to subsurface soils than the risk to workers. Only the risk to the resident was calculated.

In reviewing the data on surface soil (0 to 2 feet) for Granite Knitting Mills, Gentle Cleaners, and Parkside Apartments, it was noted that the Granite Knitting Mills facility has asphalt or buildings covering all available surface soil and, therefore, no potential for direct contact with surface soil at the facility exists. Therefore, the potential risks associated with current direct contact with surface soil were discussed in a qualitative rather than quantitative manner for the Granite Knitting Mills facility.

Air - The air pathways represented by outdoor exposure to VOCs in soil (workers and residents) or from VOCs in soil entering the home (residents) were treated in a qualitative manner because of the relatively low VOC concentration in surface soil and the statement in Risk Assessment Guidance for Superfund (RAGS) Part B (EPA, 1991), specifically: "for many undisturbed Sites with vegetative cover such as those found in areas of residential land use, air pathways are relatively minor contributors of risk." The low levels of VOCs in surface soil imply that this is not a viable source of either ingestion or inhalation of VOCs outdoors. The potential might exist for subsurface VOCs to migrate into homes along fractures in the soil and through cracks in home foundations. Again, the relatively low levels of VOCs in subsurface soil indicate that this is not a potential pathway of great concern.

Ground Water - Residential use of contaminated ground water for drinking water for current and future residents would lead to exposure through direct ingestion of water and drinks made from water; inhalation of vapors during showers, baths, and washing; and dermal absorption during showers and baths. Only reasonable maximum (or upper-bound) exposure assumptions were used for the residential-use-of-ground water scenario because of the limited range of the parameters needed to calculate intake. The upper boundary of intake-factor values for the ingestion rate, exposure frequency, exposure duration, body weight, and averaging time were used to calculate reasonable maximum exposure. Unlike the other exposure scenarios no average exposure scenario is presented for ground water.

Future Use

Table 5 shows that for future land use, residents potentially could be exposed to ground water on the Site and to subsurface soils following excavation of soil.

Risk Characterization

Summary tables of risk characterization results are shown in

Table 5 EXPOSURE PATHWAYS ADDRESSED				
Receptor (Onsite)	**Media**	**Exposure Route**	**Quantitative Assessment**	**Qualitative Assessment**
Current Land Use				
Residents—Onsite	Surface Soil	Ingestion		X
		Dermal Absorption		X
	Air (outdoors)	Inhalation		X
	(indoors)	Inhalation		X
Residents—Offsite	Groundwater	Ingestion	X	
		Dermal Absorption	X	
		Inhalation (Indoor Volatile)	X	
Workers—Onsite	Surface Soil	Ingestion		X
		Dermal Absorption		X
	Air (outdoors)	Inhalation		X
Future Land Use				
Residents—Onsite	Groundwater	Ingestion	X	
		Dermal Absorption	X	
		Inhalation (Indoor Volatile)	X	
	Subsurface Soil	Ingestion	X	
		Dermal Absorption	X	

Table 6 for residential ground water (current and future) and in Table 7 for subsurface soil (future residents only). Included in the tables are estimates of central tendency (or average) exposure as well as reasonable maximum exposure.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a Site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Results of Risk Assessment

<u>Residential Ground Water Use</u> - For ground water, the overall result is that the relatively low concentrations of VOCs equate to low risk levels. From the maximum concentrations detected, none of the VOCs are above their MCLs; most are near their detection limit. The excess lifetime cancer risk for current offsite residential use for a child calculated using reasonable maximum exposure assumptions and upper-bound concentrations is about 1×10^{-6}. For potential future onsite residential use, the excess lifetime cancer risk for a child is 2×10^{-6}, while for an adult it is 3×10^{-6}. Potential future onsite residential use was also calculated for ground water infiltrating through the soil and into the shallow aquifer. A grab sample showed a very high concentration of PCE (330 μg/l). This shallow ground water scenario yielded an excess lifetime cancer risk of 2×10^{-4} for a child and 3×10^{-4} for an adult, and a hazard index of 8 for a child and 3 for an adult. These levels are above EPA's remedial action levels for NPL sites.

<u>Exposure to Contaminated Soil</u> - For soil, the excess lifetime cancer risks from direct contact or ingestion for both a child and an adult at Parkside Apartments are well below EPA's target risk level. The excess lifetime cancer risk from ingestion and dermal contact with subsurface soil at Granite Knitting Mills is at or near EPA's target level for an adult and a child.

The excess lifetime cancer risk for Gentle Cleaners is at least 10 times higher than that of the other two facilities. PCE (found at 300,000 µg/kg at the 8- to 10-foot interval) is the primary contaminant, leading to a reasonable maximum excess lifetime cancer risk of 1 x 10^{-4} for both a child and an adult. Due to the higher levels of contamination found on this property, the soil there poses a greater threat to human health. However, since these concentrations are 8 to 10 feet below the surface, this is only a concern if the area is disturbed by excavation.

Although the soil contamination does not pose significant risks in and of itself, the levels are high enough that continued migration from soil to ground water could result in ground water concentrations that pose a threat to anyone consuming this water.

Table 7 gives the summary of risk characterization results for potential future contact by onsite residents with subsurface soil following excavation. The assumptions used to predict risk from this scenario are very conservative.

Conclusion of Summary of Site Risks

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action presented in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

7. Description of Alternatives

In accordance with section 300.430(e)(9) of the National Oil and Hazardous Substances Contingency Plan (NCP), 40 C.F.R. § 300.430(e)(9), remedial response actions were identified and screened for effectiveness, implementability, and cost during the FS to meet remedial action objectives at the Site. The technologies that passed the screening were developed into remedial alternatives. EPA assessed these alternatives against the nine criteria specified in the NCP at 40 C.F.R. Section 300.430(e)(9)(iii). In addition, EPA evaluated the No Action Alternative (Alternative 1) as required by the National Contingency Plan (NCP). These alternatives are presented and discussed below, first for the soil contamination operable unit, and then for the ground water operable unit. All projected costs and implementation time frames provided for the alternatives below are estimates. The time frames, except where noted, are estimated times for meeting the remedial objectives, not just for completion of construction activities.

Source Control Alternatives

The following alternatives were evaluated for the source control operable unit (addressing the soil contamination at the three properties). For estimates of the length of time for

Table 6
SUMMARY OF RISK CHARACTERIZATION RESULTS
RESIDENTIAL GROUNDWATER USE

Scenario/ Location	Exposure Pathway	Hazard Index		Excess Lifetime Cancer Risk	
		Average	Reasonable Maximum	Average	Reasonable Maximum
Current/Offsite					
Child	Ingestion	0.01	0.01	4×10^{-7}	6×10^{-7}
	Dermal	0.01	0.01	2×10^{-7}	3×10^{-7}
	Inhalation	0.03	0.04	5×10^{-7}	5×10^{-7}
	Total	0.05	0.06	1×10^{-6}	1×10^{-6}
Adult	Ingestion	0.01	0.01	8×10^{-7}	1×10^{-6}
	Dermal	0.003	0.004	5×10^{-7}	6×10^{-7}
	Inhalation	0.007	0.009	4×10^{-7}	5×10^{-7}
	Total	0.02	0.02	2×10^{-6}	2×10^{-6}
Future/Onsite					
Child	Ingestion	0.03	0.05	8×10^{-7}	2×10^{-6}
	Dermal	0.01	0.03	5×10^{-7}	1×10^{-6}
	Inhalation	0.09	0.2	4×10^{-7}	5×10^{-7}
	Total	0.1	0.3	2×10^{-6}	4×10^{-6}

AR301482

Table 6
SUMMARY OF RISK CHARACTERIZATION RESULTS
RESIDENTIAL GROUNDWATER USE

Scenario/ Location	Exposure Pathway	Hazard Index		Excess Lifetime Cancer Risk	
		Average	Reasonable Maximum	Average	Reasonable Maximum
Adult	Ingestion	0.01	0.02	1×10^{-6}	3×10^{-6}
	Dermal	0.01	0.01	1×10^{-6}	2×10^{-6}
	Inhalation	0.02	0.03	4×10^{-7}	4×10^{-7}
	Total	0.04	0.06	2×10^{-6}	5×10^{-6}
Future/Onsite—Shallow Aquifer Scenario (Highest Concentration of PCE)					
Child	Ingestion		2.1		9×10^{-5}
	Dermal		1.4		6×10^{-5}
	Inhalation		4.9		8×10^{-6}
	Total		8		2×10^{-4}
Adult	Ingestion		0.9		2×10^{-4}
	Dermal		0.8		1×10^{-4}
	Inhalation		1.0		7×10^{-6}
	Total		3		3×10^{-4}

AR301483

Table 7
SUMMARY OF RISK CHARACTERIZATION RESULTS
POTENTIAL FUTURE CONTACT WITH SUBSURFACE SOIL

Location	Exposure Pathway	Hazard Index		Excess Lifetime Cancer Risk	
		Average	Reasonable Maximum	Average	Reasonable Maximum
Parkside Apartments					
Child	Ingestion	<0.001	<0.001	2×10^{-9}	6×10^{-9}
	Dermal	<0.001	0.001	4×10^{-10}	4×10^{-8}
	Total	<0.01	<0.01	2×10^{-9}	5×10^{-8}
Adult	Ingestion	<0.001	<0.001	3×10^{-10}	3×10^{-9}
	Dermal	<0.001	<0.001	2×10^{-10}	3×10^{-8}
	Total	<0.01	<0.01	5×10^{-10}	3×10^{-8}
Granite Knitting Mills					
Child	Ingestion	0.001	0.009	5×10^{-8}	4×10^{-7}
	Dermal	<0.001	0.05	1×10^{-8}	2×10^{-6}
	Total	<0.01	0.06	6×10^{-8}	2×10^{-6}
Adult	Ingestion	<0.001	<0.001	8×10^{-9}	2×10^{-7}
	Dermal	<0.001	0.01	5×10^{-9}	2×10^{-6}
	Total	<0.01	0.01	1×10^{-8}	2×10^{-6}

AR301484

Table 7
SUMMARY OF RISK CHARACTERIZATION RESULTS
POTENTIAL FUTURE CONTACT WITH SUBSURFACE SOIL

Location	Exposure Pathway	Hazard Index		Excess Lifetime Cancer Risk	
		Average	Reasonable Maximum	Average	Reasonable Maximum
Gentle Cleaners					
Child	Ingestion	0.06	0.4	3×10^{-6}	2×10^{-5}
	Dermal	0.02	2.3	7×10^{-7}	1×10^{-4}
	Total	0.08	3	4×10^{-6}	1×10^{-4}
Adult	Ingestion	0.007	0.04	5×10^{-7}	7×10^{-6}
	Dermal	0.004	0.5	3×10^{-7}	9×10^{-5}
	Total	0.01	0.5	1×10^{-6}	1×10^{-4}

AR301485

cleanup and for the soil cleanup levels, the Summers model was used, with protection of ground water to background levels (using minimum detection limits) as the cleanup goal.

Alternative 1: No Action

Capital Cost:	$0
O&M Costs:	$0
Present Worth:	$0
Time to Implement:	0

Under the No Action alternative, no control or remediation of contaminated soil would take place. EPA evaluates a "No Action" alternative for every remedial action in order to establish a baseline for comparison of alternatives, as required by the National Contingency Plan (NCP), 40 C.F.R. Part 300, which regulates Superfund Actions.

The contamination levels in the soil would gradually decline due to natural attenuation processes that break down the contamination. These processes include biodegradation, volatilization, adsorption, dispersion, and photolysis. It would take between 8 and 25 years for these processes to reduce the soil contamination to levels considered protective of human health and the environment (not considering ground water exposure). During this time, no monitoring or testing of the soil contamination levels or conditions would occur.

Alternative 2: Natural Attenuation

Capital Cost:	$0
O&M Costs:	$13,704
Present Worth:	$150,744
Time to Implement:	10 years

The Natural Attenuation alternative involves taking no action to reduce the levels of contamination in the soil, but allowing natural processes to reduce the contamination levels. The processes involved include biodegradation, volatilization, adsorption, dispersion, and photolysis. This alternative is similar to Alternative 1, except that a regular monitoring program would be initiated to keep track of the contamination levels in the soil. Soil samples would be collected quarterly until contamination levels in the soil have reached acceptable levels. The cost estimates above are based on a 10 year period. It is estimated that natural attenuation would take between 8 and 25 years to reduce soil contamination levels to the remediation goals.

Alternative 3 - Excavation and Offsite Disposal

Capital Cost:	$429,516
O&M Costs:	$0
Present Worth:	$429,516
Time to Implement:	1 year

This alternative involves the excavation of soils at each of the three properties with PCE contamination that exceeds the remediation goals. This soil would be shipped to an approved facility for disposal. The remediation goals were developed for each property by evaluating the concentration of contaminants, the depth to ground water, the subsurface conditions, and other factors. The remediation goals and estimated quantity of soils needing to be removed for each property are:

Property	Remediation Goal for PCE in Soils	Estimated Quantity of Soils to be Removed
Gentle Cleaners	270 ppb	115 cubic yds.
Granite Knitting Mills	260 ppb	400 " "
Parkside Apartments	820 ppb	95 " "

Once the excavation starts, soil samples would be collected as soil is removed from the areas of contamination, and the excavation would be continued until the samples show that the remaining soil meets the remediation goals listed above. The contaminated soil would be placed in covered dump trucks or dumpsters until proper transport and disposal could be arranged. When all the contaminated soil is removed, clean fill will be brought in, the areas will be returned to their original contours and restored to previous conditions to the extent possible.

Ground Water Alternatives

The following interim action alternatives were considered for the ground water operable unit at the Site.

Alternative 1 - No Action

Capital Cost:	$0
O&M Costs:	$0
Present Worth:	$0
Time to Implement:	0

The no action alternative is required by the National Contingency Plan, 40 C.F.R. Part 300, as a baseline alternative against which other alternatives can be compared. Under this alternative, no control or remediation of the ground water would occur. The contamination levels in the ground water would gradually decline due to natural attenuation processes that break down the contamination. These processes include biodegradation, volatilization, adsorption, dispersion/dilution, and hydrolysis.

It would take approximately 91 years for these processes to reduce the contamination to levels considered protective of human health and the environment (or approximately 76 years if the soil contamination is removed). During this time, no monitoring or testing of the soil contamination levels or conditions would occur.

Alternative 2 - Natural Attenuation

Capital Cost:	$0
O&M Costs:	$11,040
Present Worth:	$367,620
Time to Implement:	30

This alternative relies on natural processes to decontaminate ground water. These processes include biodegradation, volatilization, adsorption, dispersion, and photolysis. The only activity undertaken during natural attenuation is quarterly monitoring of the contaminants of concern in the subject area. The results of the monitoring would be used to determine if natural attenuation was decreasing the concentrations of the contaminants and providing sufficient protection to human health and the environment. The monitoring would include obtaining ground water samples from the GKM well and well S-9, and would continue until the 5-year review, at which time a decision would be made by EPA whether or not continued monitoring was necessary. (The costs noted above are based on a 30-year monitoring period.)

If at any time during the monitoring period the ground water concentrations at well S-9 begin to increase to the point where they could affect the drinking water wells to the southwest, then available remedies would be evaluated, and a decision made on the appropriate remedial action to take. Natural attenuation is a viable alternative because ground water concentrations of PCE have decreased over time. However, it is estimated that it would take at least 76 years for ground water levels to reach protective levels through this method.

Alternative 3 - Extraction of Ground Water From GKM Well and Air Stripping Treatment

Capital Cost:	$7,586
O&M Costs:	$13,593
Present Worth:	$417,000
Time to Implement:	30 years

Alternative 3 includes pumping the entire GKM well, treating the extracted water using an air stripper, and discharging the treated water to the local sewer system or a nearby stream. Any effluent discharged to a stream would have to meet applicable or relevant and appropriate requirements for such a discharge. It is estimated that 13 gallons per minute of contaminated water would be pumped from this well.

Air stripping technology will be used to remove the PCE contamination from the water. Using this treatment, air is blown up through water as it trickles down through a tower or vessel. The contact between the air and the water allows the PCE to evaporate from the water into the air. The water is collected at the bottom of the unit, while the air (containing very low levels of contamination) is discharged at the top. The air emissions will be tested initially to ensure that there is no health threat posed by these emissions. The water is tested on a routine basis to ensure that it meets any discharge limitations, and to ensure the proper operation of the air stripping unit. An option to the air stripper would be to discharge the pumped ground water directly to the local sewer system, if it met discharge requirements. For each of the extraction alternatives (3, 4, or 5), this option will be evaluated during the Remedial Design.

This option also includes the monitoring of wells S-9 and S-10 to ensure that contamination is not spreading towards the municipal drinking water wells. Additional monitoring wells would be installed in locations determined to reveal the most information on the effectiveness of the pumping system.

This alternative would withdraw water from near the upgradient edge of the plume, and would prevent the contamination from moving further downgradient towards wells S-9 and S-10.

<u>Alternative 4 - Extraction of Ground Water from the Upper Interval of the GKM Well and Air Stripping Treatment</u>

Capital Cost:	$7,586
O&M Costs:	$12,417
Present Worth:	$381,000
Time to Implement:	30 years

This alternative includes pumping the upper (most contaminated) part of the GKM well. The extracted ground water would be treated in an air stripper. The total flow rate from the upper interval of the GKM well is estimated to be less than 1 gallon per minute (gpm), so an intermittent pumping operation would be required. This alternative would be effective in reducing contaminant concentrations in the ground water, since this upper interval was found to contain the highest level of contamination identified during the Remedial Investigation. The same monitoring program as discussed in Alternative 3 would be initiated under this Alternative.

AR301489

Alternative 5 - Extraction of Ground Water from Well S-9 with Air Stripping Treatment

Capital Cost: $8,586
O&M Costs: $22,829
Present Worth: $695,000
Time to Implement: 30 years

This alternative involves pumping of the entire volume of well S-9, and treating of the extracted ground water in an air stripper. This well would be expected to produce about 80 gpm of contaminated water. This well is located in the approximate center of the plume, and therefore would be effective in containing the plume and preventing migration of contamination to wells that have not yet been impacted. Contamination levels in different intervals in this well have ranged from 9 to 24 parts per billion. By pumping this well, pockets of contamination that exist between the Gentle Cleaners and Granite Knitting Mills properties may be drawn into the well and pumped out. This well is also deeper than the Granite Knitting Mills well, and will withdraw water from the deeper interval (which has some contamination in it). The same monitoring program as discussed in Alternative 3 would be initiated under this Alternative.

8. Summary of Comparative Analysis of Alternatives

The Alternatives discussed above were compared on the basis of the nine criteria set forth in the NCP at 40 C.F.R. Section 300.430(e)(9) in order to select a remedy for the ground water Operable Unit. These nine criteria are categorized according to the three groups below:

THRESHOLD CRITERIA

Overall protection of human health and the environment
Compliance with applicable or relevant and appropriate requirements (ARARs)

PRIMARY BALANCING CRITERIA

Long-term effectiveness and permanence
Reduction of toxicity, mobility, or volume through treatment
Short-term effectiveness
Implementability
Cost

MODIFYING CRITERIA

Community acceptance
State acceptance

These evaluation criteria relate directly to the requirements in Section 121 of CERCLA, 42 U.S.C. § 9621, which determine the overall feasibility and acceptability of the remedy.

Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs among remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan. A summary of each of the criteria is presented below, followed by a summary of the relative performance of the soil and ground water alternatives with respect to each of the nine criteria. These summaries provide the basis for determining which alternative provides the "best balance" of trade-offs with respect to the nine criteria.

Overall Protection of Human Health and the Environment

CERCLA requires that the selected remedial action be protective of human health and the environment. A remedy is protective if it reduces current and potential risks to acceptable levels within the established risk range posed by each exposure pathway to the contamination.

Compliance With ARARs

This criterion addresses whether a remedy will meet ARARs or provide grounds for invoking a waiver under the NCP at 40 C.F.R. Section 300.430(f)(1)(ii)(C) and CERCLA, Section 121(d)(4), 42 U.S.C. § 9621(d)(4). Under Section 121(d) of CERCLA, remedial actions at CERCLA Sites must attain applicable or relevant and appropriate standards, requirements, criteria, and limitations (collectively referred to as "ARARs") under federal environmental laws and promulgated State environmental or facility siting laws, unless such ARARs are waived pursuant to Section 121(d)(4) of CERCLA.

Applicable requirements are those substantive environmental standards, requirements, criteria, or limitations promulgated under Federal or State law that are legally applicable to the remedial action to be completed at the Site. A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to Sections 104, 106, or 122 of CERCLA. Relevant and appropriate requirements are those substantive environmental protection standards, requirements, criteria, or limitations promulgated under Federal or State law which, while not being legally applicable to the remedial action, do pertain to problems or situations sufficiently similar to those encountered at the Site that their use is well suited to the Site. ARARs may relate to the substances addressed by the remedial action, to the location of the Site, or to the manner in which the remedial action is implemented.

CERCLA requires that remedial actions meet applicable or relevant and appropriate requirements (ARARs) of other Federal and state environmental laws or provide grounds for invoking a waiver. These laws may include, but are not limited to, the Toxic Substances Control Act, the Clean Water Act, the Safe Drinking Water Act, and the Resource Conservation and Recovery Act.

In addition, Section 121(d)(2)(A) of CERCLA requires a level of cleanup "which at least attains Maximum Contaminant Level Goals (MCLG) established under the Safe Drinking Water Act (42 U.S.C.A. § 300f et seq.) and water quality criteria (WQC) established under section 304 or 303 of the Clean Water Act (33 U.S.C.A. § 1314 or 1313), where such goals or criteria are relevant and appropriate under the circumstances of the release . . . ." 42 U.S.C. § 121(d)(2)(A). In accordance with the NCP, relevance and appropriateness of a requirement is determined by comparing, where pertinent, the circumstances of a release to eight factors discussed below. Pertinence of a factor depends, in part, on whether a requirement addresses a chemical, location, or action [40 C.F.R. § 300.400(g)(2)].

Long Term Effectiveness/Permanence

This evaluation criterion addresses the long-term protection of human health and the environment after remedial action cleanup goals have been achieved, and focuses on residual risks that will remain after completion of the remedial action.

Reduction of Contaminant Toxicity, Mobility, and Volume Through Treatment

This evaluation criterion addresses the degree to which a technology or remedial alternative reduces the toxicity, mobility, or volume of a hazardous substance. Section 121(b) of CERCLA, 42 U.S.C. § 9621(b), establishes a preference for remedial actions that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. A combination of treatment and engineering controls may be used, as appropriate, to achieve protection of human health and the environment, as set forth in the NCP at 40 C.F.R. Section 300.430(a)(iii). Treatment should be utilized to address the principal threats (such as liquids, high concentrations of toxic compounds, and highly mobile materials) presented by a Site and engineering controls such as containment will be considered for wastes that pose a relatively low, long term threat or where treatment is impracticable. *See* 40 C.F.R. § 300.430(a)(iii).

Short-term Effectiveness

This evaluation criterion addresses the period of time needed to achieve protection of human health and the environment, and any adverse impacts that may be posed by construction and implementation of a remedy.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of each remedy, including the availability of materials and services needed to implement the chosen remedy.

Cost

The cost of each of the alternatives is evaluated, and compared to the no action alternative.

State Acceptance

The EPA, as lead agency for this Site, selects the remedy in consultation with the State. EPA has provided the information on which this Record of Decision is based to the Pennsylvania Department of Environmental Resources (PADER), and has had discussions on this matter with PADER representatives. PADER has not yet indicated whether or not it will concur with the final action for OU1 and the interim action for OU2.

Community Acceptance

The comments and concerns expressed by the public during the public meeting and during the comment period are considered. This criterion includes a determination of which components of the alternatives interested persons in the community support, have reservations about, or oppose based on public comments.

SOURCE CONTROL ALTERNATIVES

Overall Protection of Human Health and the Environment

Alternatives 1 and 2 would not protect human health or the environment from present contamination levels. The risk posed by the facilities would not be decreased to protective levels. The risk of potential exposure to the contaminated media would continue. These alternatives would only provide sufficient protection of human health and environment when all soil PCE concentrations were decreased through natural process. The contaminated soil may require up to 16 years of natural attenuation to reach the soil remediation goals for PCE in soil. During this time, the monitoring done under Alternative 2 would

AR301493

provide information on the reduction in PCE levels occurring in the soil, which would not be known under Alternative 1.

Alternative 3 would provide protection of human health by eliminating the possible exposure to contaminated soil. All soil with PCE at concentrations above the soil remediation goals would be removed from the Site and properly treated and/or disposed of in an EPA-approved disposal facility. This would also improve the ground water by eliminating the primary source of contamination.

Alternative 1 would not provide adequate protection of human health and the environment and would not address the remedial action objectives. Alternative 2 would require a long cleanup time, and continual monitoring also would be required to verify the effectiveness of natural attenuation. Alternative 3 (excavation and offsite disposal) would provide short- and long-term protection of human health and environment at the Site by removing the contaminated soil.

Compliance with ARARs

The evaluation of the ability of the alternatives to comply with ARARs included a review of chemical-specific and action-specific ARARs that were presented in the Feasibility Study. There are no known location-specific ARARs for the Site.

The no-action alternative would not meet any chemical-specific ARARs. Action-specific ARARs are not applicable because no action would occur. Alternative 2 would eventually achieve the remediation goal for PCE in soil. Action-specific ARARs are not applicable because the only activity taken during natural attenuation is quarterly monitoring of the contaminants of concern. Alternative 3 would meet the remediation goal for PCE at each facility, and would meet ARARs for such actions.

Long-Term Effectiveness and Permanence

The no-action alternative would not provide long-term effectiveness and permanence. The risk currently associated with the facilities would not be decreased and may be increased through continued migration of contaminants. Although natural attenuation processes could occur, this alternative provides no control or monitoring of the contaminants. Because contaminants would be left at the facilities, a review of the Site conditions would be required every 5 years. Alternative 2 would eliminate long-term exposure to contaminants because natural processes would reduce contaminant concentrations, and the monitoring would provide information on the current levels of contamination and on when the remediation goals were reached. Alternatives 1 and 2 would also not contribute to improvements in ground water. Alternative 3 would eliminate short- and long-term exposure to

PCE in concentrations greater than remediation goals because contaminated soil above these goals would be removed from the Site. The long-term effectiveness would be realized by properly treating the contaminated soil before landfilling.

Alternative 3 would provide a higher degree of long-term protection from risks than would alternatives 1 and 2.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternatives 1 and 2 would not provide any reduction of toxicity, mobility, and volume and would not meet the statutory preference for treatment. For Alternative 2 the monitoring results would be used to verify that natural attenuation was decreasing the concentrations of the contaminants. Alternative 3 would reduce the mobility and migration of contaminants because the contaminants would be disposed of in a permitted landfill offsite. Alternatives 2 and 3 would provide reduction in toxicity, mobility, and volume of the contaminated soil.

Short-Term Effectiveness

Because no action would occur under Alternative 1, the level of risk to human health and the environment would remain at current levels. Under alternative 2, the level of short-term risk to human health and the environment would remain at current levels. Alternative 1 and 2 would not affect human health during their implementation. Implementation of alternative 3 would have some potentially adverse effects on human health and the environment. Volatile emissions and fugitive dust could increase during the excavation and transportation of soil around the Site. In addition, trucks would be required to transport the contaminated soil to an offsite facility. The probability of traffic accidents on the roads between the Site and the disposal facility would increase. These impacts can be minimized by using proper construction and transportation techniques.

There are no additional short-term risks associated with alternatives 1 and 2. For alternative 3, short-term effectiveness would be affected by the required excavation and transportation of soil.

Implementability

The no-action alternative does not have a monitoring or construction component associated with it; therefore, there are no issues concerning implementation. Alternative 2 would be easy to implement. Continual monitoring of the contaminants of concern in the subject area would be required to verify the effectiveness of natural attenuation. A contingency plan would be developed for implementation if sampling data indicated that the contamination was posing a threat to human or environmental receptors. Alternative 3 is implementable. Its elements are all routine construction activities. All equipment and materials exist and are readily available. Soil may require treatment at a disposal facility to comply with regulations.

Cost

The table below summarizes the costs of the three soil alternatives for the source control operable unit.

SUMMARY OF COSTS OF SOIL ALTERNATIVES 1, 2, AND 3			
	Alternative 1 (No Action)	Alternative 2 (Natural Attenua-tion)	Alternative 3 (Excavation and Offsite Disposal of Soil
Capital Costs	$0	$0	$429,516
O&M Costs	$0	$13,704	$0
Total Present Worth Costs	$0	$150,744	$429,516

The no action alternative would require no expenditure of money for capital purposes. As part of the 5-year review process, samples may be required and time expended on preparing a report detailing the risk associated with the facilities. However, these costs have not been included here. The capital cost for Alternative 2 would be $0. The annual O&M cost would be $13,704. The total present worth cost based on monitoring conducted over a 10-year period would be $150,744. The total present worth cost of alternative 3 is estimated to be $429,516. No O&M costs are expected because the technology does not involve an extended remediation period and because no long-term management, maintenance, or monitoring would be required.

State Acceptance

PADER has not indicated whether or not it concurs with the final action remedy for OU1 and the interim action remedy for OU2.

Community Acceptance

This criterion includes a determination of which components of the alternatives interested persons in the community support, have reservations about, or oppose based on public comments. A public meeting was held on the proposed plan on July 14, 1994 in

July 6 through August 4, 1994. Comments received at the meeting and during the comment period are discussed in the Responsiveness Summary attached to this Record of Decision.

GROUND WATER REMEDIATION ALTERNATIVES

Overall Protection of Human Health and the Environment

The no-action alternative would not protect human health or the environment from present contamination levels. The risk posed by the facilities would not be decreased to protective levels. The risk of potential exposure would continue from the contaminated media. Alternative 2 would provide sufficient protection to human health and environment when all ground water PCE concentrations are decreased. It may take up to 91 years for the process of natural attenuation to reduce the contamination in ground water to the background concentration if the contaminated soil is not treated or removed from the Site. Up to 76 years would be required if the contaminated soil is removed. During this time, sampling would indicate the concentration levels and location of contamination, and appropriate steps could be taken if a health or environmental hazard is identified.

Alternative 3 would provide protection to both human health and environment. Ground water extraction and air stripping treatment would reduce the threat to human health posed by ingestion of contaminated ground water and would reduce the possibility of further environmental degradation. This alternative is not totally effective in treating the entire plume because the GKM well is at the head of the contaminant plume, and would only withdraw a portion of the plume while pumping the well. Also, large volumes of clean ground water would be pumped from upgradient and sidegradient of the well because of the well's location at the edge of the contaminant plume. Relying solely on pumping, the GKM well appears to not be effective in addressing the entire plume; however, the value in pumping from this well is to intercept and remove the more highly contaminated ground water assumed to be present in and entering the aquifer in the vicinity of Gentle Cleaners. Contaminated ground water downgradient from the pumping influence of the GKM well would continue to migrate toward pumping well S-10.

For Alternative 4, overall protection of both human health and the environment would be similar to that of alternative 3. The remediation time is estimated to be less than the cleanup time for alternative 2 because the highly contaminated ground water carrying through the fractures above the water level into the well would be intercepted and pumped off. For Alternative 5, overall protection of both human health and the environment would be similar to that of alternative 3. The length of time required for cleanup would vary depending on removal of the contaminated soil (the source of contamination).

Compliance with ARARs

The no-action alternative would not meet any chemical-specific ARARs. Action-specific ARARs are not applicable because no action occurs. Alternative 2 would achieve the MCL for PCE once the natural attenuation processes are completed. Action-specific ARARs are not applicable because the only activity taken during natural attenuation is quarterly monitoring of the contaminants of concern. Alternative 3 would meet the MCL for PCE (5 $\mu g/l$). To meet action-specific ARARs, the ground water treatment system would be designed to meet the NPDES criteria or pretreatment standards for discharge of treated water to a POTW or local surface water body. The air treatment systems for this technology, if required, would be designed to comply with federal and state regulations.

Alternative 4 and 5 would be similar to alternative 3 with regard to ARARs. In addition, the ground water treatment system for any treatment alternative would be designed to meet federal and state limitations to prevent exceedances of the water quality standards for discharge of treated water to the creek or treatment plant.

Long-Term Effectiveness and Permanence

Alternatives 1 and 2 would not provide long-term effectiveness and permanence. The risk currently associated with the facilities would not be decreased and may be increased through migration of contaminants. This alternative would provide no control of the contaminants. Because contaminants would be left at the facility, a review of the Site conditions would be required every 5 years. Alternative 2 would provide information on the location and concentrations of contamination, and indicate when the remediation goals have been met. Alternative 3 would eliminate long-term exposure to contaminants because human health risks posed by ingestion of ground water in the future would be reduced commensurate with the reduction of PCE to less than 5 $\mu g/l$ by the pump and treat systems. The long-term effectiveness and permanence of alternatives 4 and 5 individually would be similar to that of alternative 3, except that Alternative 5 would not prevent the migration of contaminated ground water from the GKM well into the drinking water aquifer. The central location of Well S-9 in the plume makes it a good choice for pumping for containment of the plume.

Reduction of Contaminant Toxicity, Mobility, and Volume Through Treatment

Alternatives 1 and 2 would not provide any reduction of toxicity, mobility, or volume beyond that from naturally occurring processes, and would not meet the statutory preference for treatment. For Alternative 2, the monitoring results would be used to verify that natural attenuation was decreasing the concentrations of the contaminants.

Under Alternative 3, pumping the GKM well withdraw the contamination from the upgradient portion of the plume, which would be effective in controlling the migration of contaminants towards the municipal drinking water wells. Well S-9 is in the radius of influence of the GKM well. Therefore, the ground water that has contaminant concentrations near the MCL would be pulled back to the northeast by the pumping of the GKM well.

Alternative 4 would reduce the toxicity of the water in the aquifer by eliminating the highest source of contamination entering the aquifer (the shallow interval of the Granite Knitting Mills well). This should help to limit the further migration of the plume. This alternative would not address the contamination that exists in the plume and that has moved into lower levels of the aquifer. The water extracted from the upper interval would be treated to levels safe for discharge.

Alternative 5, pumping of Well S-9, would reduce the levels of contamination throughout the plume area. This well is located in the approximate center of the plume; pumping of this well would withdraw contaminated water from throughout the plume. It would not eliminate the highest source of contamination entering the aquifer, but would intercept this contamination as it moved down into the aquifer and downgradient of the GKM well. The water extracted from the this well would be treated to levels safe for discharge.

Short-Term Effectiveness

Because no action would occur under Alternative 1, the level of risk to human health and the environment remains at current levels. No short term benefits or risks would be realized. Under alternative 2, the level of short-term risk to human health and the environment would remain at current levels. On the other hand, alternative 2 would not affect human health during implementation, and would provide information on the degree and location of contamination.

For Alternative 3, the air stripper would produce the off-gas at a very low emission rate of 1.95 x 10^{-5} lb/hr of PCE, which is considered insignificant. Once the ground water extraction and treatment systems are installed, the contaminant plume would begin to recede from its current position. Implementation of alternative 4 would have some possibility of risk, similar to that of alternative 3. The emission rate is estimated at 1.5 x 10^{-6} lb/hr of PCE. Alternative 5 would have some possibility of risk, similar to that of alternative 3. The emission rate is estimated at 2.0 x 10^{-4} lb/hr of PCE. Each of these alternatives also involves some minor construction activities and vehicular traffic. It is possible that monitoring wells may need to be installed to assist in the performance evaluation of the pump and treat system(s).

Implementability

Alternative 1 does not have a monitoring or construction component associated with it; therefore, there are no issues concerning implementation. Alternative 2 would be easy to implement. Periodic monitoring of the contaminants of concern in the subject area would be required to verify the effectiveness of natural attenuation. A contingency plan (extraction/treatment) would be developed for implementation if the sampling data indicated that contamination was posing a threat to human or environmental receptors.

Alternative 3 is implementable. It involves the use of proven technologies. All equipment and materials exist and are readily available. Operation would require monitoring of the ground water and the air to assess the effectiveness of the ground water extraction and treatment systems. One potential disadvantage of Alternative 3 is that much of the extracted ground water could have a PCE concentration near or below 5 µg/l. Pumping test data indicate that, after 24 hours of pumping, the PCE concentration in the extracted ground water decreased over time and the sample sent to the CLP had a concentration of 3 µg/l. Alternative 3 could therefore be needlessly treating water that already meets the MCL.

The implementation of alternative 4 would be the same as that of alternative 3, except only periodic pumping of the upper part of the well is feasible because it will generate only 1 gpm. Alternative 4 has an advantage in that only a small amount of contaminated ground water from the GKM well would need to be removed and treated. The disadvantage is that only periodic pumping of the upper part of the well is feasible, which makes treatment operations difficult.

The implementation of Alternative 5 would be the same as that of alternative 3, except that only the contaminated ground water from well S-9, and not from the GKM well, would be extracted and treated. Alternative 5 has a disadvantage in that well S-9 will produce a large volume (80 gpm) of relatively clean ground water that would need to be treated before discharge to a sewer or nearby stream (unless direct discharge to a treatment plan can be arranged).

Cost

Taking no action would require no expenditure of money for capital purposes. The capital cost for Alternative 2 would be $0. The O&M costs would be $11,140 per year. The total present

AR301500

worth cost based on monitoring over a 30-year period would be $367,620.

The estimated present worth cost of alternative 3 would be $417,000, with a capital cost of $7,586 and an annual O&M cost of $13,593. The total present worth cost for Alternative 4 is estimated to be $381,000 based on a capital cost of $7,586 and an annual O&M cost of $12,417. The total present worth cost for Alternative 5 is estimated to be $695,000. The capital cost is $8,586, and the annual O&M cost is $22,829. Each of these estimates is based on a thirty year operating period.

The table below summarizes the costs of the five ground water alternatives.

SUMMARY OF COSTS OF GROUND WATER ALTERNATIVES 1 THROUGH 5

	Alt. 1 (No Action)	Alt. 2 (Natural Attenuation)	Alt. 3 (Extraction from GKM Well and Treatment)	Alt. 4 (Extraction from Upper Part of GKM Well and Treatment)	Alt. 5 Extraction From Well S-9 and Treatment)
Capital Costs	$0	$0	$7,586	$7,586	$8,586
O&M Costs (per year)	$0	$11,040	$13,593	$12,417	$22,829
Total Present Worth Costs	$0	$367,620	$417,000	$381,000	$695,000

State Acceptance

PADER has not indicated whether or not it concurs with the final action remedy for OU1 and the interim action remedy for OU2.

Community Acceptance

As discussed in the "Community Acceptance" section under the soil remediation alternatives evaluation, the comments and concerns expressed by the community are presented in the Responsiveness Summary attached to the Record of Decision.

9. Selected Remedy and Performance Standards

Based on the comparisons of the nine evaluation factors for each of the alternatives, Alternative 3 for source control operable unit (Excavation and Offsite Disposal of contaminated soil) and a combination of Alternatives 4 and 5 for the ground water operable unit (Pumping and Treating of the upper interval of the Granite Knitting Mills well and the entire Well S-9), are the selected remedies for the Site. The Proposed Plan for the North Penn Area 1 Site was released on July 5, 1994. The Proposed Plan identified the alternatives listed above as the preferred alternatives. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedies, as originally identified in the Proposed Plan, were necessary.

Source Control Operable Unit

Alternative 3 for the remediation of contaminated soil will involve the excavation of soils at each of the three properties with PCE contamination that exceeds the remediation goals. This soil would be shipped to an approved facility for disposal. The remediation goals were developed for each property by evaluating the concentration of contaminants, the depth to ground water, the subsurface conditions, and other factors. The performance standards for remediating the soils, and the estimated quantity of soils needing to be removed for each property, are presented below. These were developed through the use of the Summers model, with protection of ground water to background levels (using minimum detection limits) as the cleanup goal.

Property	Remediation Goal for PCE in Soils	Estimated Quantity of Soils to be Removed
Gentle Cleaners	270 ppb	115 cubic yds.
Granite Knitting Mills	260 ppb	400 cubic yds.
Parkside Apartments	820 ppb	95 cubic yds.

Once the excavation starts, soil samples would be collected as soil is removed from the areas of contamination, and the excavation would be continued until the remaining soil meets the remediation goals listed above. The contaminated soil would be placed in covered dump trucks or dumpsters until proper transport and disposal can be arranged. The contaminated soil will be disposed of at an EPA-approved facility that is permitted to accept such wastes. When all the contaminated soil is removed, clean fill will be brought in, the areas will be returned to their original contours and restored to previous conditions to the extent possible. The generation, storage, and transport of the contaminated soil will comply with the applicable and relevant and appropriate requirements of Pennsylvania Waste Management regulations at 25 Pa. Code Sections 262.12, .13, .20, .30, and .34.

During the excavation process, appropriate measures will be taken to minimize exposure of workers and nearby residents to

AR301502

contamination. Air monitoring will be conducted by EPA and/or its contractors, and levels will be established which, if exceeded, will require the implementation of additional control measures or the cessation of all work activities. Barriers or fences will be installed to limit access to the excavation and staging areas.

Implementation of Alternative 3 for the source control operable unit will remove any threat of direct contact exposure. In addition, a goal of this action, in conjunction with the remedial action taken under OU2, is to remediate ground water to levels established in the ARARs.

The actions taken under this remedial action will comply with the applicable and relevant and appropriate sections of Pennsylvania regulations, found at 25 Pa. Code Chapters 260-270, Hazardous Waste. This Alternative will also comply with the substantive requirements of Pennsylvania Erosion Control Regulations, codified at 25 Pa. Code Chapter 102.

On-Site activities of the selected alternative will also be performed in compliance with all other applicable legal requirements (e.g., worker health and safety laws and regulations, see 40 C.F.R. § 300.150) that are not within the scope of federal environmental or state environmental or facility siting laws.

Ground Water Operable Unit

The selected interim action alternative for the ground water operable unit is a combination of Alternatives 4 and 5. Alternative 4 consists of pumping just the upper interval (the top 30 to 40 feet) of the Granite Knitting Mills well. It is in this interval that the highest levels of PCE are found entering the well, and subsequently moving down into the drinking water aquifer. By pumping this interval only, the high levels of PCE are removed, while minimizing the amount of relatively clean water that would have to be treated. This well is located near the upgradient end of the plume. The water in the deeper intervals of this well (the well depth is approximately 190 feet) is being drawn in from areas outside the plume, and therefore pumping these intervals does not help eliminate the contamination in the ground water. Pumping the shallow interval would yield approximately 2 gallons per minute of water. This interval would be packed off from the rest of the well, and pumped intermittently when a sufficient quantity of water has built up in the well.

Alternative 5 involves pumping of the entire Well S-9. Due to the central location of this well, pumping it is expected to contain the plume and draw contaminated water from throughout the plume area. This well is approximately 245 feet deep, and would produce approximately 80 gallons per minute of water. The combination of pumping these two wells will eliminate the highest source of contamination entering the ground water, and will also contain the plume and remove some or all of the contamination already in the ground water.

The water that is extracted from these wells will most likely be combined and treated in one treatment system.The treated water will be discharged to a local stream, or to the local sewer system. One option that may be pursued is the direct discharge of the extracted water to the sewage treatment plant. The majority of the water extracted from the ground has relatively low levels of contamination. This water (from Well S-9) has PCE levels that typically are just above the Maximum Contaminant Level (MCL) which is the level considered safe for drinking water supplies. Although it may exceed the MCL, contamination at this level does not present a threat to public health or the environment if discharged to a sewage treatment plant. Sewage treatment plants can generally handle water with contamination levels in this range without adverse effects, and can still meet discharge limitations that apply to them. The smaller quantity of more highly contaminated water extracted from the Granite Knitting Mills well will not significantly increase overall contamination levels when the flows are combined.

The exact design of the extraction and treatment system has not yet been determined. During the design process, these details will be worked out and approved by EPA and PADER. Prior to selecting any particular option, proper approvals will have to be obtained (e.g., approval from the local authorities for discharge to the sewage treatment plant), and plans for the remedial action will be presented to the public prior to its implementation.

Ground Water Cleanup Levels

The well system for extracting ground water shall be operated until the ground water is cleaned up to background levels. The Pennsylvania ARAR for ground water for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa.Code §§ 264.90 - 264.100, specifically 25 Pa.Code §§ 264.97(i) and (j) and § 264.100(a)(9), which are relevant and appropriate requirements under the Pennsylvania Hazardous Waste Management Regulation. The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is also found in other legal authorities. The cleanup level for each contaminant of concern in the ground water is the background concentration of that contaminant. The background concentration for each contaminant of concern shall be established by EPA during Remedial Design. Pennsylvania's "Groundwater Protection Strategy", dated February 1992, is a "to be considered" requirement for determining appropriate ground water cleanup levels. This strategy will be considered in the design of the extraction system, and in the final remedial action taken for this operable unit. In the event that a contaminant of concern is not detected in samples taken for the establishment of background concentrations, the method detection limits of EPA approved low level drinking water analytical methods with respect to that contaminant of concern or MCLs, whichever are more stringent, shall constitute the "background" concentration of the contaminant.

Ground Water Extraction System

The ground water shall be decontaminated through extraction and treatment of the contaminated ground water throughout the area adjacent to the two pumped wells. The goal of the extraction is to create a capture zone to capture contaminated ground water throughout the plume. Ground water shall be extracted using two extraction wells, the GKM well and Well S-9. For the final remedial action for this operable unit, this interim system shall be evaluated, and a determination will be made on whether additional extraction wells are needed to remediate the plume.

Air Stripper

The water from the extraction wells shall be treated using a packed column air stripper. Air flow rates and air stripper dimensions shall be determined during the remedial design and shall be approved by EPA in consultation with PADER. Air emissions from this unit will meet applicable or relevant and appropriate Pennsylvania regulations at 25 Pa. Code, Chapters 123.1, 123.2, 123.31, and 123.41, and Chapter 127.1. Any wastes generated at the stripper are subject to Waste Management Regulations at 25 Pa. Code Chapters 260 and 261. As discussed above, direct discharge to a sewage treatment plant may be selected as an alternative if proper approval can be obtained. This would be done in consultation with the PADER and local authorities.

Discharge of Treated Water

The treated water from the air stripper unit shall be discharged into the local unnamed tributary Skippack Creek, or to the local sewage treatment plant if approved. The point of discharge shall be determined during the remedial design and shall be approved by EPA in consultation with PADER. The discharging of water shall comply with requirements of NPDES standards (or with applicable pretreatment standards for a treatment plant). These requirements are found in Pennsylvania Water Quality regulations at 25 Pa. Code Chapters 16, 92 and 93

AR301505

(the Skippack Creek drainage basin is listed in Section 93.9f) The specific discharge criteria shall be established by EPA during Remedial Design.

Quality Control Monitoring

Parameters, frequency and type of monitoring of process variables including discharge water and air from the air stripper shall be determined during Remedial Design and shall be approved by EPA.

Monitoring of Cleanup

A system of monitoring wells shall be designed to monitor the cleanup progress throughout the plume and shall be installed. Number and locations of these monitoring wells shall be approved by EPA in consultation with PADER. These wells will be used to evaluate the effectiveness of this interim action for ground water. The data collected from these wells will be evaluated to determine whether or not the interim ground water extraction system is sufficient to remediate the contamination in the entire plume area. This determination will be made as part of the final action on this operable unit.

The monitoring wells that are installed shall be sampled quarterly for the first two years and semi-annually thereafter until the levels of contaminants of concern in these wells have reached the background levels. Once background cleanup levels are reached throughout the plume, these wells shall be sampled for twelve consecutive quarters and if contaminant levels remain at these levels, the operation of the extraction system shall be shutdown. Semi-annual monitoring of the ground water shall continue for five years. If subsequent to the extraction system shutdown, monitoring shows the ground water concentrations of any contaminant of concern to be above background or other agreed upon cleanup level, the system shall be restarted and continued until the levels have once more been attained for twelve consecutive quarters. Semi-annual monitoring shall continue until EPA determines in consultation with PADER that contaminants have reached stable levels below background. If the final remedial action indicates that additional extraction and/or monitoring wells are needed, the entire monitoring systems shall be reevaluated and redesigned in accordance with the standards specified in the Record of Decision for that final action.

In addition to monitoring the ground water quality, EPA shall also conduct an initial delineation and functional assessment of wetlands in the area. As part of the monitoring, EPA will conduct an annual assessment of the vegetation and functional continuity of the identified wetlands to ensure that the pumping of ground water does not adversely impact these areas through lowering of the water table. Surface waters potentially affected by the discharge of treated water or ground water will also be monitored initially to ensure that no adverse impacts are occurring.

Five Year Review

Because DNAPLs may remain on-Site as a source of future ground water contamination, Five Year Reviews shall be conducted after the remedy is implemented to assure that the remedy continues to protect human health and the environment. A Five Year Review work plan shall be drafted after the remedy is implemented and shall be approved by EPA in consultation with PADER.

The five-year review required by Section 121 of CERCLA, 42 U.S.C. § 9621, is applicable to the selected remedy, and this requirement will continue as long as residual contamination remains above the Maximum Contaminant Level for PCE.

The Pennsylvania Hazardous Waste Management Regulation, codified at 25 Pa. Code §§ 264.90-264.100, requiring cleanup of ground water to background quality is a relevant and appropriate requirement for this action. The selected alternative is being taken as an interim action. The eventual goal of the ground water operable unit is to attain compliance with this ARAR. EPA will evaluate the effectiveness of the selected combination of alternatives, and will issue a final Record of Decision on this operable unit which will either commit to the goal of achieving this requirement, or provide a rationale for why it cannot be achieved in this case.

Implementation of Alternatives 4 and 5 will ensure that MCLs for PCE continue to be attained at the locations where this standard is relevant and appropriate (*i.e.*, in the drinking water aquifer). These Alternatives will comply with the Erosion Control Regulations, codified at 25 Pa. Code Chapter 102.

On-Site activities of the selected alternative will also be performed in compliance with all other applicable legal requirements (*e.g.*, worker health and safety laws and regulations, *see* 40 C.F.R. § 300.150) that are not within the scope of federal environmental or state environmental or facility siting laws.

10. Statutory Determinations

Under its legal authorities, EPA's primary responsibility at CERCLA Sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. One such requirement is that, when complete, the Selected Remedy implemented at the Site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The Selected Remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment as a principal element to permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

A. Protection of Human Health and the Environment

The Site, in its existing condition, does present a potential threat to human health or the environment. Levels of PCE in ground water have been identified at levels that exceed the MCLs. Levels found in the soil are continuing to contribute to contamination in the drinking water aquifer. If the plume continues to spread, additional wells may be affected. Therefore, the alternatives selected here are designed to remove the potential threat to the drinking water supply. Removal of the contaminated soil will eliminate the source of the ground water contamination, and pumping and treatment of the contaminated ground water will contain the plume and eventually reduce ground water concentrations to acceptable levels. Implementation of the selected remedies will protect human health and the environment by eliminating the source of contamination and protecting drinking water supplies in the area.

B. Compliance with Applicable or Relevant and Appropriate Requirements

The selected alternatives will comply with the ARARs discussed in connection with these alternatives in Section 7 and 9 of this ROD. For the ground water operable unit, which is an interim action, achievement of background levels of contamination is the goal of the remediation. This goal will be reevaluated in the final ROD that will be issued in the future.

C. Cost-Effectiveness

Section 300.430(f)(1)(ii)(D) of the NCP, 40 C.F.R. § 300.430(f)(1)(ii)(D), requires that the selected remedy be cost-effective. That section of the NCP states that cost-effectiveness is determined by first evaluating the following three of the five "balancing" criteria to determine overall effectiveness of the remedy: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy is cost-effective if its costs are proportional to its overall effectiveness.

The remedy selected for the soil contamination operable unit is expected to be cost effective in protecting human health and the environment. Although Alternative 3 was the most expensive alternative evaluated, it is the only one of the three that effectively removes the contamination that is contributing to ground water contamination. If the soil cleanup is not completed, the cost for cleanup of ground water will be much greater. It is more cost-effective to eliminate the source of the contamination in the soil rather than to treat the ground water once it becomes further contaminated. Other treatment alternatives were evaluated during the Feasibility Study, but were screened out due to high costs or technical infeasibility. The three areas needing to be addressed are too small for several of the treatment techniques, and the soil conditions are not conducive to others.

For the ground water operable unit, Alternatives 4 and 5 are the third and most expensive alternatives, respectively. The combination of the two is more expensive than all the other alternatives. However, the cost estimates are believed to be an absolute maximum. Costs are based on separate treatment systems for each alternative; a combined system for both would significantly lower costs. If extracted water is discharged to a sewage treatment plant without treatment, an even greater savings will be realized. Although the selected alternatives are expensive, they are necessary to protect drinking water in the area. High levels of PCE are still entering the Granite Knitting Mills well in the upper interval. Levels of PCE have been found in intervals of Well S-9 ranging from 9 to 24 ppb. There is a possibility that pockets of higher contamination exist in the area around Well S-9. Therefore, pumping this well will draw this contamination out of the drinking water aquifer, and pumping the shallow interval of the Granite well will prevent this higher level contamination from entering the aquifer. Therefore, this remedy is cost-effective.

D. Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The alternatives selected are permanent solutions to the contamination at the Site. The soil excavation and removal will permanently eliminate the source of the ground water contamination. The pump and treat system for the ground water contamination will permanently remove the contaminants from the aquifer to the extent practicable. Once this treatment system has operated for a sufficient time to reduce the PCE levels in ground water to acceptable levels and maintain these levels, this will be a permanent solution.

Various treatment alternatives were evaluated during the feasibility study. However, none of these alternatives were found to be cost effective or technically feasible for this Site. No resource recovery options were feasible for the conditions present at this Site.

Consequently, EPA has determined that the selected remedies utilize permanent solutions and alternative treatment technologies to the maximum extent practicable, while providing the best balance in terms of long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short term effectiveness; implementability; and cost.

E. Preference for Treatment as a Principal Element

The remedy selected for the source control operable unit does not satisfy the CERCLA preference for remedies that incorporate treatment as a principal element. Although EPA reviewed several treatment technologies for application to this Site, EPA believes that none of these treatment technologies is practicable for use in cleaning up this Site. This is primarily due to the fact that three different properties would require treatment, and the quantity of soil at each property is very small. Soil conditions at the Site limit or eliminate the use of some possible soil treatment techniques. Further, EPA determined that the treatment alternatives did not provide the overall best balance in meeting the nine criteria for selection of remedial actions.

For the ground water operable unit, treatment has been selected as a principle element in the remedy for the contaminated ground water. The water extracted from the wells will be treated at the Site prior to discharge, or will be treated in a sewage treatment plant if direct discharge to a plant is found to be acceptable.

11. Documentation of Significant Changes

The Proposed Plan for the North Penn Area 1 Site was released in June 1994. The Proposed Plan identified excavation and offsite disposal of contaminated soil (Alternative 3) for operable unit 1, and pumping and treating of the upper interval of the Granite Knitting Mills well and the entire Well S-9 (Alternatives 4 and 5) as an interim action for operable unit 2, as the preferred alternatives. EPA reviewed all the verbal comments received at the public meeting (no written comments were received). Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

Responsiveness Summary
North Penn Area 1 Site
Souderton, Montgomery County, Pennsylvania

This Responsiveness Summary documents public comments received by EPA during the public comment period on the Proposed Plan for the North Penn Area 1 Site ("the Site"). It also provides EPA's responses to those comments. The Responsiveness Summary is organized as follows:

SECTION I Overview

This section summarizes recent actions at the Site and the public's response to the remedial alternatives listed in the Proposed Remedial Action Plan (Proposed Plan). The Proposed Plan outlines various cleanup alternatives available to address Site contamination and highlights EPA's preferred alternatives.

SECTION II Background on Community Involvement

This section provides a brief history of community interest in the site and identifies key issues.

SECTION III Summary of Major Comments and Questions Received During the Public Meeting and EPA's Responses

This section documents comments and questions from the public that were voiced during the public meeting regarding the Site and EPA's responses to them.

I. Overview

The public comment period on the Proposed Plan for this Site began on July 6, 1994 and ended on August 4, 1994. EPA held a public meeting at the Souderton Municipal Building on July 14, 1994. Copies of the newspaper advertisements announcing the meeting and comment period are attached.

The following EPA participants were present at the meeting:

Amy Barnett	Community Relations Coordinator
Gregory Ham	Remedial Project Manager

At the meeting, EPA representatives summarized the results of the Remedial Investigation (RI), Feasibility Study (FS), and the Risk Assessment performed for the Site. EPA presented the preferred alternatives to address Site contamination. The Proposed Plan addressed the areas of soil contamination, and the groundwater contamination plume. The preferred alternatives for the Site presented to the public were the excavation and offsite disposal of soil from the three affected facilities, and the pumping and treatment of groundwater from two wells near the center of the plume.

The public was given an opportunity to ask questions or submit written comments on the alternatives outlined in the Proposed Plan and the results of the RI/FS for the Site. The comments from the public meeting, and EPA's responses, are summarized in Section III of this document. They are not presented in the order received at the meeting. The complete transcript of the public meeting is contained in the Administrative Record file for the Site.

No written comments were received during the comment period.

SECTION II Background on Community Involvement

This Site was placed on the National Priorities List on March of 1989. Upon being listed, EPA began the Remedial Investigation/Feasibility Study (RI/FS) process, and in March of 1992 EPA issued a fact sheet summarizing the status of the Site and EPA's plans for the RI/FS at this Site. EPA representatives also were present at the April 6, 1992 Borough Council meeting to brief the Council and answer any questions on Site plans and activities.

For this Record of Decision, a formal public meeting, as discussed above, was held. At the public meeting, attendees were invited to ask questions directly to EPA representatives about the Proposed Plan and the work that has been done at the Site during the Remedial Investigation/Feasibility Study, and about the preferred alternatives for cleaning up the Site. The main concerns expressed at this meeting were about the liability for the Site and the costs of cleaning up the contamination.

SECTION III Summary of Comments and Questions from the Public Meeting

The comments raised at the public meeting primarily concerned three areas: liability, recovery of costs, and the nature of the proposed remedial actions. The issues raised, and the EPA responses to these issues, are presented below.

Comment #1: When determining liability for site cleanups, the Superfund law presumes that people are guilty, especially in the case of current owners of a property where contamination occurred under previous ownership.

Response: Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund) there are four primary categories of liable parties: owners, operators, arrangers for treatment or disposal, or transporters of hazardous wastes. The owners category includes current owners of contaminated property, and those who owned the property during the time the contamination occurred or any time since the contamination occurred. The intent of the law was to limit the time spent in determining who was liable for the cleanup by including a broad liability scheme. This has been one of the biggest areas of contention of the Superfund law, and is a major topic in the current Superfund reauthorization discussions. Until the current law is changed, EPA must carry out the law as currently written, including provisions for determining liability.

Comment #2: When are affected property owners given releases allowing them to sell or modify their properties?

Response: EPA does not issue "releases" to a property owner stating that the property is clean and suitable for any purpose. When EPA determines that a remedial action is needed on a property, the remediation or cleanup goals are established as part of the remedial design. Then the remedial action is carried out. Once the remediation goals are met, a closeout report is issued summarizing the actions taken, documenting the achievement of the remediation goals, and discussing the current status of the site. This report is available to the public, including the owner of the property. However, EPA does not issue a release.

Comment #3: Are properties removed from the list of potentially responsible parties (PRPs) once the property is cleaned up?

Response: EPA keeps records of any parties considered to be PRPs for each site it is working on under Superfund. As the term implies, these are "potentially" responsible parties. No conclusive decisions have been made concerning liability just by an entity being listed as a PRP. In later actions to attempt to get PRPs to conduct investigations or cleanup actions, or to recover funds expended, EPA must provide evidence of the PRPs involvement in the contamination to support such attempts, and the affected parties have recourse provided for under the Statute.

EPA does not remove PRPs from the list once they are on it, since the list provides a record of the investigations that have occurred for each site. This does not mean that the entity continues to be considered as a "responsible party" when information shows otherwise.

Comment #4: Does EPA make an effort to recover costs from property owners or other PRPs?

Response: Yes, EPA does attempt to recover all costs expended to investigate and clean up sites. In all Superfund cases, EPA investigates the liability of PRP's and evaluates their financial status and assets to determine if actions can be taken to recover costs. This is being done with this Site. The Agency does not comment on the possibility of future actions to recover costs.

Comment #5: How are costs apportioned among PRPs in the cost recovery process?

Response: In determining how the costs are to be apportioned, EPA prepares a complete list of all known PRPs. For the PRPs on the list, factors such as amount of wastes attributable to each PRP and ability to pay are considered. From an evaluation of these and other factors, EPA can sometimes determine an appropriate cost for each remaining PRP. However, it is important to remember that under the Superfund law, each PRP remains jointly and severally liable for any costs.

Comment #6: Are costs billed once the project is completed, or are interim billings issued?

Response: The way the costs are recovered varies depending on the situation. Where no remedial action is taken after the Remedial Investigation/Feasibility study, EPA must initiate legal actions to recover funds within 3 years of completion. If a remedial action is initiated, EPA must initiate cost recovery actions within 6 years of the initiation of the action. EPA can also use administrative processes (demand letters and/or consent agreements) to initiate cost recovery actions at any time there are outstanding costs. Which route EPA uses depends upon the specific circumstances of the individual sites.

Comment #7: How is the priority determined for whether or not a site gets cleaned up? Could it take 10 years from the time the decision is made that a remedial action is needed until the actual cleanup occurs?

Response: Once a site is listed on the National Priorities List, EPA evaluates the site and determines the appropriate strategy for investigating the site. It may be divided up into operable units, with each unit being investigated in sequence, or the entire site may be addressed in one action. Each site or operable unit proceeds according to schedules that reflect the nature and complexity of the problems being addressed. If an immiment health threat is discovered, an emergency removal action can quickly be initiated. The priority for cleanup depends on a number of factors, such as available funding, workloads, number of sites being investigated, etc.

Once the Record of Decision (ROD) is issued determining that a remedial action is necessary, the action is usually taken within a year or so of the ROD. It would be unusual for a cleanup to be initiated 10 years after the ROD.

Comment #8: The soil excavation would leave a large hole at each property. What would be done? Much of the area at Parkside is reportedly fill consisting of concrete blocks. What would be done with that?

Response: The details of the soil cleanup will be presented in the Remedial Design, which will be released to the public before the cleanup is initiated. In general, EPA attempts to restore properties to conditions existing prior to the action taken. Any excavation areas will be filled with clean fill, with contours restored to previous levels. The soil will be sampled as the excavation continues, and only soil or other fill material contaminated above the cleanup levels will be removed. If any concrete blocks are encountered, the surfaces may be tested for contamination, and a decision would be made based on the test results what action would be needed to dispose of these. All contaminated soils or other materials will be shipped to an approved disposal facilited permitted to accept such materials.

Comment #9: Would discharging the contaminated water extracted from the wells to the sewage treatment plant create a hazard for the treatment plant?

Response: Discharging of the contaminated water to the treatment plant would only be done if the appropriate approvals were obtained from the authority operating the plant. All applicable, substantive pretreatment standards or discharge limitations for the treatment plant would have to be met. If the discharge from the pumped wells would adversely affect the operation of the treatment plant, than other treatment alternatives would have to be implemented.

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